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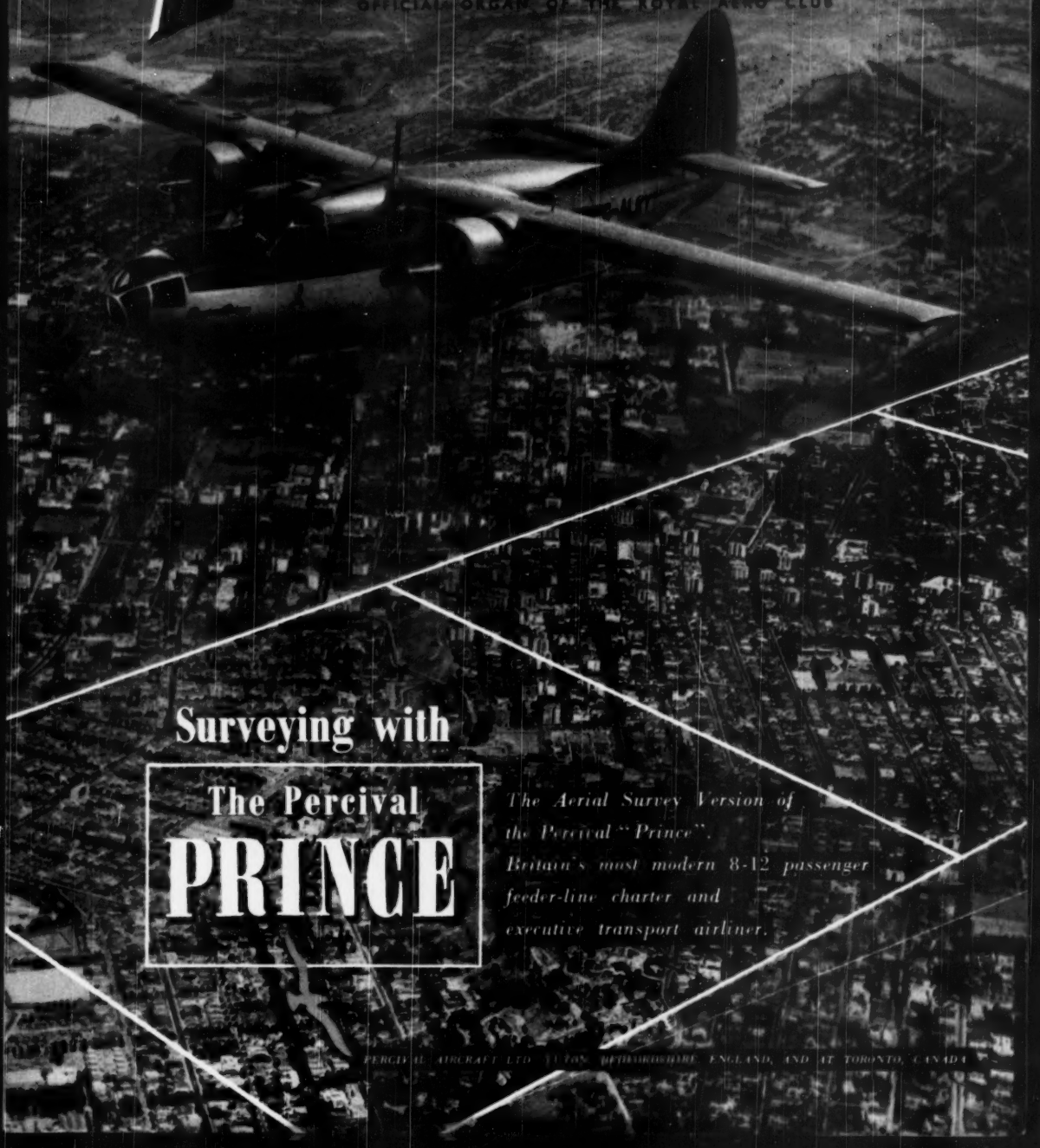

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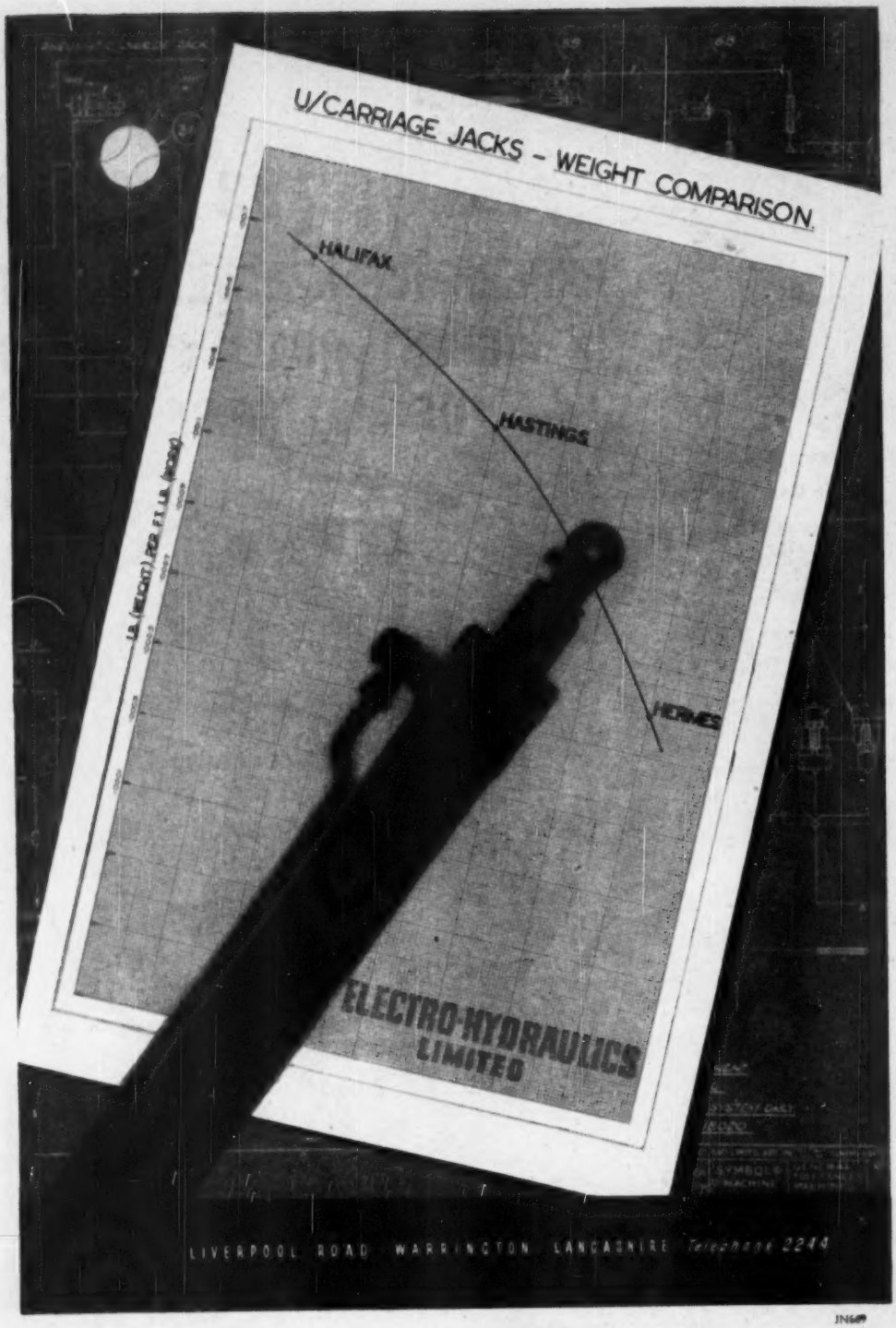
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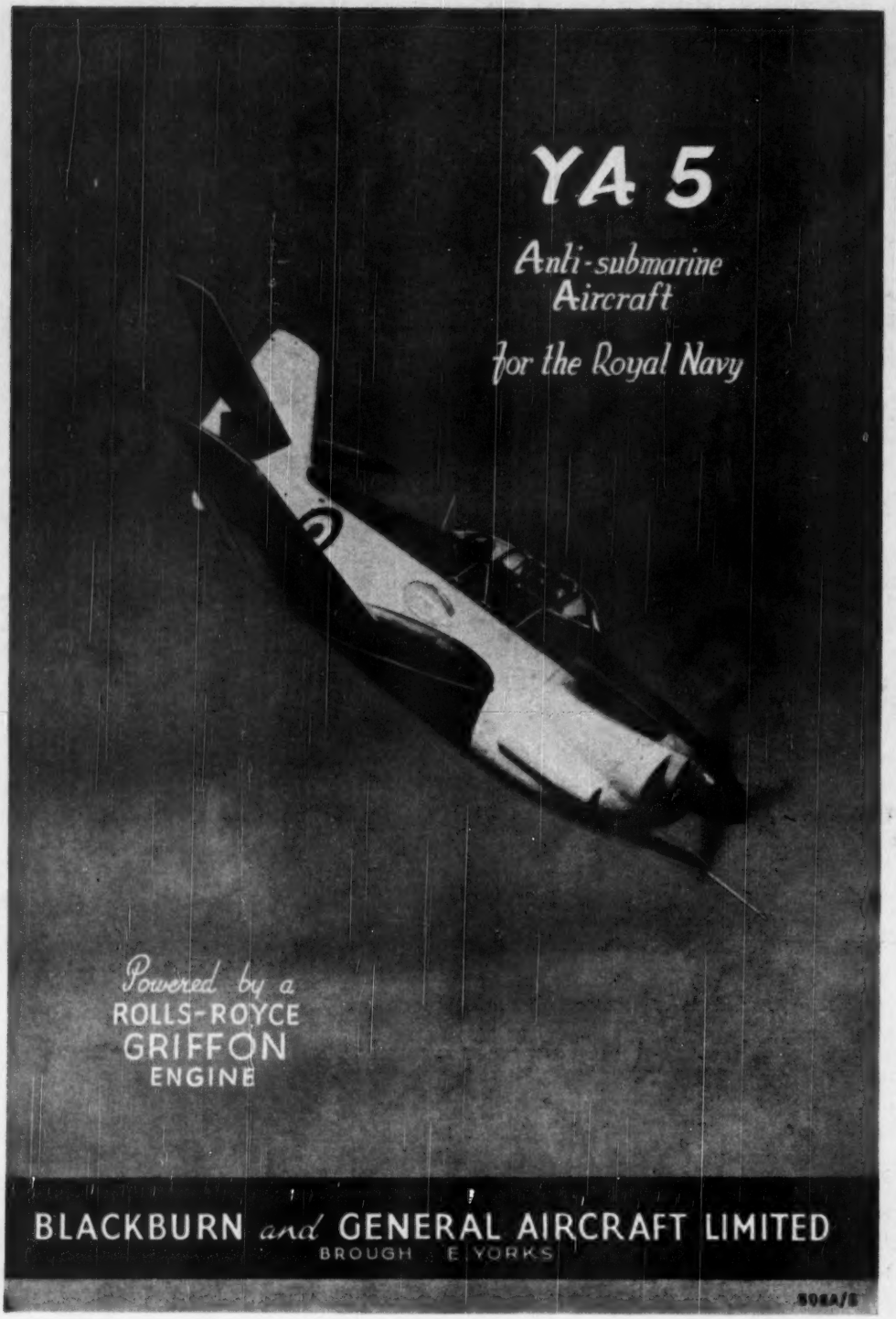
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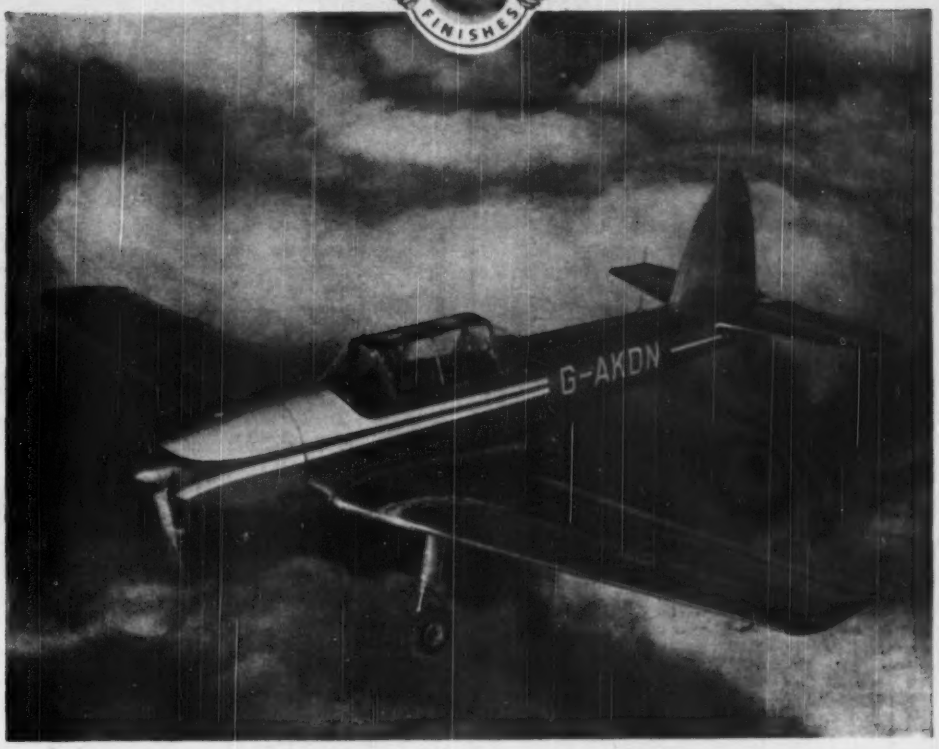

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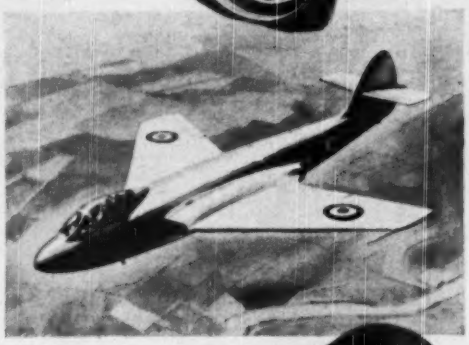

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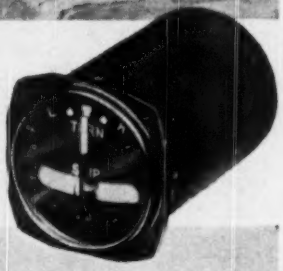

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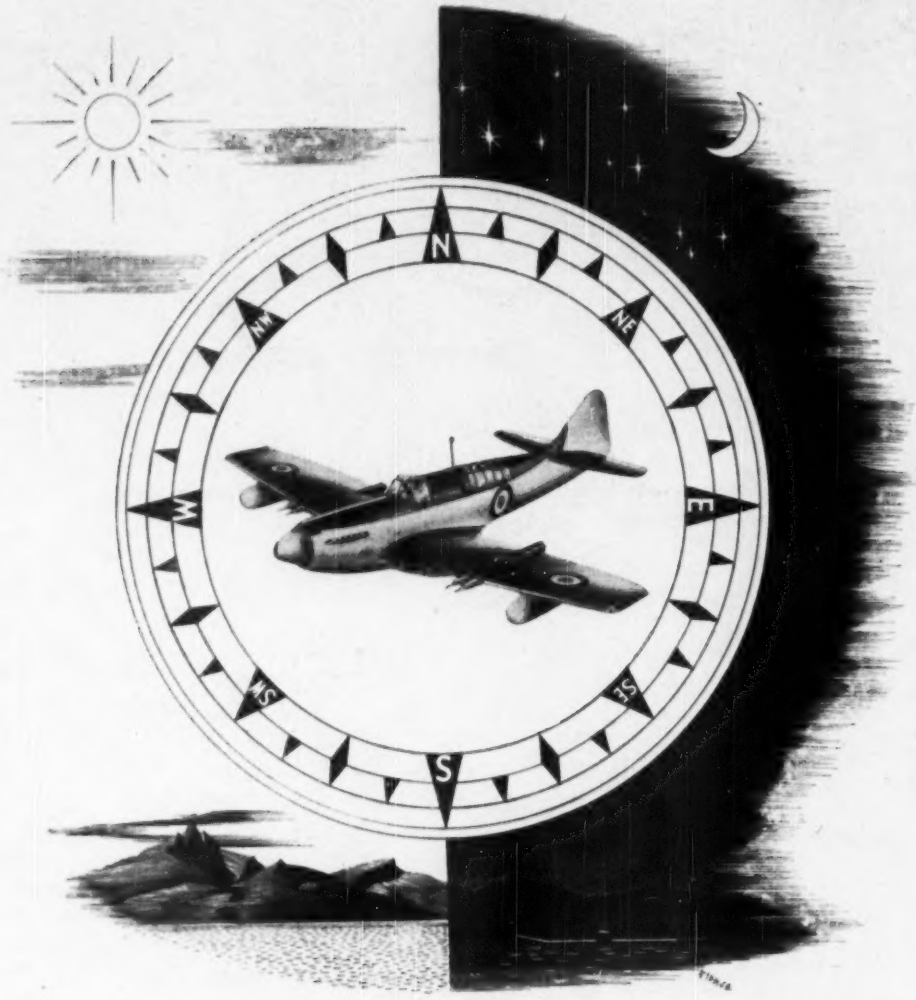

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Sand and Snow

IT has long been a Service requirement that, before acceptance, a new type of aircraft shall prove its mettle in a hot climate. This precaution notwithstanding, there was more than one embarrassing hiatus just before and during the last war, when standard machines in squadron service proved to be inadequately equipped or otherwise unsuitable for operation under climatic conditions imposed by strategical demands. Hasty improvization and adaptation became the order of the day, but it was occasionally necessary to withdraw certain types of aircraft from theatres which were taxing them too greatly for safety. Humidity, sand and heat all took their toll of our fighting potential. In more recent years there has been gratifying evidence that the authorities have been more resolutely seeking to safeguard against recurrence of such dangers in any future campaign under extreme climatic conditions. The Vampire, Meteor and Firefly are among the types to have distinguished themselves in hard-baked, sand-swept deserts, humid jungle-lands and—most important, in view of the possible course of a future war—the Arctic wastes.

Especially satisfactory has been the pooling of British, Canadian and American experience in the cold-weather operation of post-war aircraft. New techniques and equipment, affecting men and machines alike, are still being evolved, and the tactical and strategical implications of Arctic warfare have been studied in the recently concluded Operation *Sweetbriar*. That British first-line aircraft—the Vampire, for example—should have rendered exemplary service with Swedish Air Force squadrons, again in rigorous conditions, is a further reassurance. On the medical side, the Royal Navy's Arctic survival tests, now continuing, constitute another most valuable source of experience under operational conditions.

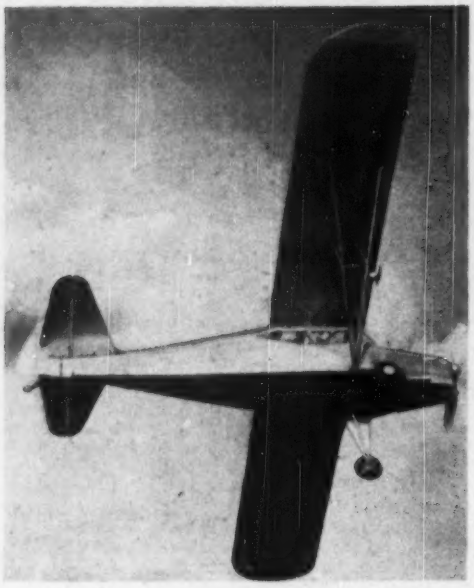
But the establishment of a true global air force is a vast undertaking. Having made certain that power plants will start up readily and run reliably in deadly cold or driving sand, that airframes will not deteriorate in remote regions and that their crews will be equipped to operate them, if not in comfort, then without undue physical hardship, the means must now be evolved for rescuing imperilled crews from the appalling wildernesses on the world's roof. Here is scope indeed for invention and hardihood.

Wanted—a Light Twin

NOT infrequently, the Englishman travelling abroad admires some particularly pleasing but unfamiliar device, confection or garment—and upon examination finds it to be of British make, "for export only." Where vehicles—bicycles, cars or aircraft—are concerned, however, it is widely agreed that there should also be a home market, if only because such machines are likely to be viewed with suspicion abroad if they are not sold in the producing country, and are therefore receiving only limited home testing and development. It would be wrong, however, to take it as an absolutely hard-and-fast rule that where no home demand is permitted there can be no export possibilities.

It is now many months since we first advocated a careful study of light-aircraft requirements in the Dominions and elsewhere abroad, but during the intervening period not just enthusiasts but men of considered opinion have, with us, continued to advocate the building of a British light twin to meet specific overseas needs. In the past the Gemini was tried, but, its all-wood construction proved unsuitable for tropical climates. In addition, it lacks the essential rugged simplicity.

In America the Twin Bonanza was announced quite recently; it looks most promising, but who can afford 30,000 U.S. dollars? The Czechs have produced the attractive Aero 45, but who can do business with them, and what of after-servicing and spares? The requirement still remains for a strong and simple metal 4- or 5-seater with fixed undercarriage and perhaps two Gipsy Major engines. Reliability should head the list of its virtues and it should be able to come home on one engine and to operate from small and inferior air-strips. All hydraulics, unessential electrics and gadgetry must be omitted, and the price kept in the region of £3,500.



Sturdy and manœuvrable, the new Auster will make a good club trainer. It has much in common with the Autocrat.

AUTOCAR
In the Air

Impressions of an Economical Four-seater with Gipsy Major Engine

No. 36 OF THE SERIES By THE EDITOR

Illustrated with "Flight" Photographs

IN these penny-plain times it is doubtful whether a better or more practical answer could have been found to the aircraft needs of our harassed and harried clubs and private pilots than the Auster Autocar. During the last year or two it has been a necessity, not a choice, to place the accent on economy in everything to do with private-enterprise civil aviation. For economy, therefore, the Autocar makes use of as many existing components as possible, and it is offered with a war-surplus Gipsy Major I engine of unquestionable reliability, having an overhaul period sufficient to give most private owners some seven years of flying with no more than an occasional routine maintenance outlay. The Autocrat, with which the Autocar has much in common, has shown that maintenance and C. of A. costs can be kept low by simple and sturdy design. Finally, the cost price of £1,500 for a quite lively four-seater is undoubtedly modest for the scale of production to be anticipated in this country.

Most potential Autocar owners, we feel, will not be particularly interested to read a collection of figures and aerodynamic details; rather will they wish to know something of handling characteristics, performance and costs. It is of interest, however, to record briefly that the Autocar has the sturdy military Mk 6 undercarriage (wheels and brakes are interchangeable with those of the Autocrat); a modified J.5 fuselage; Autocrat wings and struts with modifications in the root bays; Autocrat tailplane and elevators; and an enlarged fin and rudder which, even so, are basically standard Auster structures. When the Autocar made a brief first appearance at Farnborough last year, it had Autocrat vertical tail-surfaces. The new fin and rudder with horn balance (containing also the mass balance) has much improved the stability and handling. A steerable tailwheel is no longer a standard fitting, nor is it considered necessary. However, both steerable tailwheel and Goodyear self-aligning main wheels would be available as extras.

Both the metal airscrew and the silencer are standard fittings. It has not escaped attention that the silencer is unsightly, and more compact versions have been examined. None of these will be fitted, however, until they have been developed and proved as reliable as the present standard type. An electric starter and wind-driven generator are bought-out extras costing the quite disproportionate price of £160.

Those with experience of Gipsy Major installations will welcome the incorporation of a small oil cooler of the type used on military Austers.

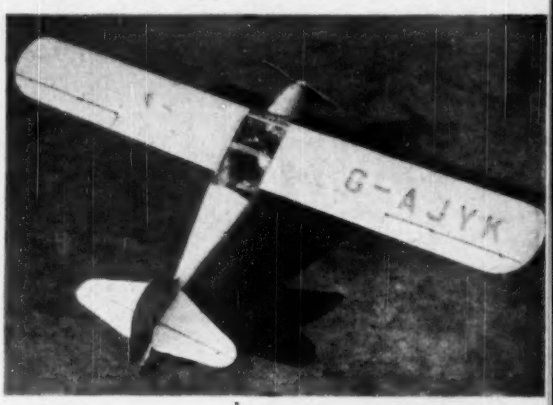
Non-technical features deserving comment are the cabin with increased headroom, pleasantly curved and domed transparent rear enclosure, and back seats with some 8in more width than in the Autocrat. Behind the rear seat, incidentally, is a hatch giving access to a tray intended to carry any of the small standard V.H.F. radio sets now on the market.

For delivery flights or special long-range duties, an extra internal tank would be recommended. An external tank is not considered desirable, nor would the standard Autocrat long-range tank fit under the Autocar's curved belly. Standard tankage is for 32 gallons, one rigid 16-gallon tank (with fuel gauge) being located in each wing root. With the fuselage tank-free, smoking is permitted.

The Autocar is not very easy to get into or out of, although with practice the process should present no great problem. There are, of course, only two doors, and the usual small step is provided. To get into the back seats one must step over or slide backwards over the front seats, the backs of which fold flat. The doors now have hold-open catches.

The panel and control layout—neat and simple—resembles that of other Austers. Dual control is provided, and the throttle is on a central quadrant. The compass with reflector mirror is located centrally in the roof. Illustrations of the panel and controls appeared with other Autocar photographs in our January 26th issue.

On a pleasant winter's afternoon last week I spent about



Four men fit quite comfortably into the Autocar two-door cabin.

This particularly pleasing photograph shows the Autocar family four-seater near Windsor Castle. With the 130 h.p. Gipsy Major 1 engine, and all essential equipment, the price is £1,500. The silencer, a standard fitting, is bulky but effective.

an hour trying out the Autocar, having first asked (a little rashly, perhaps, as will appear) S/L. Ranald Porteous to take me up and put the aircraft through its paces. After a convincing demonstration of the normal flying characteristics I was subjected to a loop-roll-half-roll-stalled-turn-and-roll-off-the-top more or less in one continuous manœuvre, without negative *g*, of course, and then deposited back at Fairoaks airfield to have a go myself.

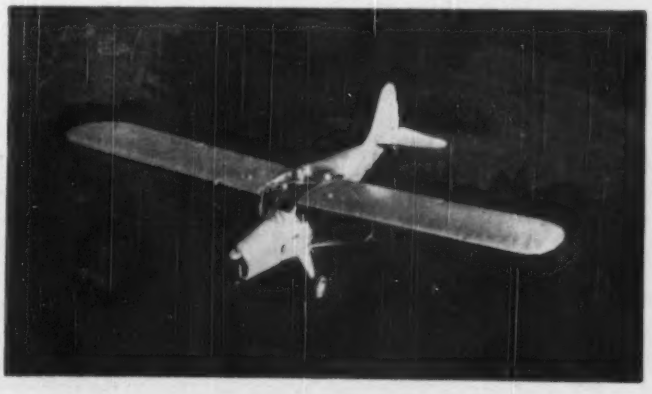
One thing I had noted as soon as we had started up was the smooth tick-over of the Major in this installation. It is well above average. Taxying is a simple procedure, and although use of the rudder alone produces virtually no effect, the separate heel brakes (which I personally accept but do not favour) were quite smooth and effective, producing an immediate response for positive directional control on the ground. Because the pneumatic-cushioned seats are set higher, the forward view is better than on the Autocrat, even though the engine is a little larger. The ground was rough and furrowed, but the springing proved quite adequate.

Take-off, two up, feels much as it does on the Autocrat, but there is appreciably more urge. Under the circumstances (rough, heavy ground and light wind) it was better to leave the tail down for most of the run, and as a result the Autocar flew off a little early on my first attempt. There was, however, no tendency to flop back on to the ground; in fact, with only about 45-50 m.p.h. on the clock, the aircraft was anxious to climb away with a feeling of speed and control in hand. The larger fin and rudder make for good directional control on take-off but in any case there was no particular tendency to wander. As is customary I used one-third flap, and the trimmer (in the roof, as on the Autocrat) was set at a fraction nose-heavy. Later take-offs, made solo, indicated that there is no danger in holding the stick well back and letting the Autocar fly off, when ready, at speeds as low as 45 m.p.h. I.A.S. The run is only about 120 yd, and if trimmed correctly the aircraft will climb steadily hands-off as soon as it is airborne. This is a big advance in stability over the Autocrat. Actual figures with full load show that the Autocar climbs best at 70 m.p.h. and takes no more than 200 yards to unstick from grass in a 5 m.p.h. wind. The rate of climb is about 580 ft/min, although when flying solo it is nearer 1,000 ft/min.

Once in the air, the difference in feel between Autocar and Autocrat is immediately noticeable. The Autocar both feels and is demonstrably more stable. All controls are nicely harmonized and just a little heavier than the three-seater; this is, in my opinion, an advantage. An impression is gained of being in a more substantial Auster, though not one lacking in liveliness.

Medium and steep turns call for no special comment, except perhaps to remark that the new roof and higher sitting position seem to give a better view over the inside wing when banked. Rear-seat passengers can see very well indeed. As an additional stability check one can try making medium turns with feet off the rudder. The Autocar does really require some rudder, but turns can be initiated and a change-over made by using ailerons alone, with no more than 5 deg of slip or skid.

Slow flying, right down to the stall, is so well controlled that one never need fear to stooge-on in thick weather or put down in a small field. I tried all sorts of stalls with and



A new rear-fuselage line and larger tail surfaces make the Autocar rather better looking than the familiar three-seat Autocrat. A metal airscrew is fitted.

AUTOCAR In the Air . . .

without engine and with and without flap. In all cases a harmless and docile straight sink with little warning is the first symptom at a ridiculously low indicated speed, in the extreme case, of about 28 m.p.h. The true speed is probably less than 35 m.p.h. With full flap and plenty of power it is necessary almost to stand on one's tail to stall. Without flap the stall occurs some 8 m.p.h. sooner.

If the Autocar is held in the stall one wing will drop after a pause, and there is a tendency, if it is still held, for the next move to be a fairly abrupt drop of the opposite wing. Recovery is immediate on releasing the stick from the full backward position. Recovery from a spin is likewise immediate.

The Autocar is stressed and licensed for ordinary positive *g* aerobatics, and all can be performed with much the same ease and control as in a Tiger Moth. Slow rolls are not advised, but a slight barrelling makes the manœuvre acceptable and at the same time more comfortable. Speeds required for loops, half rolls, and so on, are also about the same as for a Tiger, and the Gipsy engine should be handled in the same way. Both as pilot and passenger I found the lap-strap-type belts quite satisfactory for aerobatics.

Maximum permitted speed is given as 160 m.p.h., although there would probably be no danger if this were exceeded by 10 or 20 m.p.h. In practice one would never be likely to exceed 150 m.p.h. except by intention. Change of power and speed does not call for much change of elevator trim and even the raising and lowering of flap makes only a small difference. The trim control—a standard fitting—will no doubt suit those familiar with the Autocrat. It is sensitive, which is a good feature, but it works in the wrong sense and wrong plane for convenience. Knob forward an inch on the horizontal winder, for example, results in a considerable nose-up trim change.

On the approach one is tempted to glide at a low air speed to get more sink, because the rate of descent is not very great with only two passengers. According to circumstances and weight, and with some flap lowered (by use of the familiar four-position lever on the port wing-root), a comfortable gliding speed would usually be between 50 and 60 m.p.h. I felt that a little more flap would have been convenient, for even at 50 m.p.h., both solo and two up, the final approach was quite shallow.

In comparison with the Autocrat there is considerably more feel about the hold-off, and by the third landing I felt reasonably confident of pulling off a firm three-pointer more or less on a selected spot. This is another Autocar feature which will appeal from the instructional viewpoint.

After touch-down it is advisable to keep the stick right back when running over ridges or rough ground, to avoid any tendency to buck. This is nothing to worry about normally but may be a little uncomfortable over rough patches. The landing run itself is quite short, and brakes may be used fairly fiercely without fear of nosing over. There was no tendency to swing.

There is little doubt that most people will agree that, from the handling point of view, the Autocar shows an all-round improvement over earlier models. It offers the pilot a better-feeling aircraft, safe and pleasant to fly in all ordinary manœuvres, and it offers the three passengers a little more room and comfort. Conversation does not entail shouting when cruising along at about 105 m.p.h. and 2,100 r.p.m., and the view for all is better. The importance of having a Gipsy Major engine, with its world-wide reputation for reliability, will be appreciated on the export market as well as at home.

DATA FOR THE FOUR-SEAT AUSTER AUTOCAR
130 b.h.p. de Havilland Gipsy Major 1C

Span	36ft	11 m
Length	23ft 4in	7.1 m
Height	8ft 3in	2.5 m
Track	6ft	1.8 m
Gross wing area	185 sq ft	17.2 m²
New Fin and Rudder Dimensions		
Gross fin area	19 sq ft	1.76 m²
Net fin area	5.1 sq ft	0.47 m²
Rudder aft of hinge	8.85 sq ft	0.82 m²
Horn area	0.25 sq ft	0.02 m²
Rudder depth	5.05 ft	1.53 m
Performance		
Max speed	118 m.p.h.	190 km/hr
Max cruising speed	106 m.p.h.	170 km/hr
Service ceiling	11,000ft*	3350 m
Max range	552 miles	840 km
Take-off run	600ft	183 m
Landing run	540ft	165 m

JUNIOR MINISTERS

JUNIOR ministers appointed in Mr. Attlee's new Government, and whose names were approved last week by the King, include Mr. A. M. Crawley (41 years of age), who succeeds Mr. G. de Freitas as Parliamentary Under Secretary, Air Ministry; and Mr. F. Beswick (57), who becomes Parliamentary Secretary, Ministry of Civil Aviation, in succession to Mr. G. S. Lindgren. In the Ministry of Supply, Mr. J. Freeman is appointed Parliamentary Secretary in succession to the two Joint Parliamentary Secretaries of the previous Government.

Mr. Crawley and Mr. Beswick are both newcomers to office.

Mr. de Freitas now goes to the Home Office and Mr. Lindgren to the Ministry of Town and Country Planning.

RUSSIA'S AIR POTENTIAL

FACTUAL accuracy of any book on the Soviet Armed Forces must naturally be viewed with a certain amount of mistrust, for, as the author of *The Soviet Air Force** admits, "The U.S.S.R. has successfully held the blue riband for military inaccessibility over the last thirty years."

Even while Russia was a war-time ally, we were rarely taken into her confidence. For example, it was not until January, 1946, that Stalin announced that "Soviet aircraft production had exceeded British production during the war." He certainly made no such claim in 1942, when hundreds of British seamen died bringing aircraft in convoys to Russia.

Even fewer facts, figures and photographs of Russia's post-war aviation have slipped past the Iron Curtain, so it would be unwise to place too much faith in the estimates of Russian production and aircraft strength given by the author of this book, W/C. Asher Lee, although they appear reasonable enough in most cases. On the other hand, there is a lot of other information of undoubted value to anyone wishing to form a background picture of Russia's Air Force, aircraft industry and people.

The author traces briefly the birth and growth of the Soviet Air Force, its methods of training and war record, the organization and employment of Russia's airborne forces and the capabilities of her aircraft industry. He ends with a review of present production and future possibilities.

The most significant fact that emerges is that, despite its war-time achievements, the Soviet Air Force really has had no practical experience of fighting against the modern generation of jet and rocket fighters, radio-controlled bombs or radar-equipped night fighters. The Luftwaffe was compelled to use such equipment exclusively on the Western Front, to try to prevent the destruction of Germany by British and American bombers. Technically, Russia ended the war five years behind her enemy and her allies, without any experience in the use of radar for defence or attack, and with very little experience of long-range bombing.

W/C. Lee explains how, since 1945, Russia has been making desperate efforts to close that gap, with the help of German scientists and engineers, and has already developed advanced types of jet fighters, heavy bombers and rockets. Furthermore, her own scientists, whose brilliance should never be under-estimated, have given her the atomic bomb, and she is now striving to develop a six-engined "B-36-type" bomber able to carry it over an effective range. He estimates that Russia has a present front-line force of about 15,000 warplanes, backed by production of up to 30,000 aircraft a year, 2,000 of them four-engined bombers.

But, he adds, there are still serious gaps in her defences, due partly to lack of radar equipment, but more to the fact that the Soviet Air Force is basically a tactical weapon, never intended to fight a strategic war. As proof, he points out that on the one or two occasions in 1944 when the depleted Luftwaffe was able to counter-attack, it always revealed that weakness. It would probably be unwise to count on this too much, but W/C. Lee's book indicates that it is fundamental to the Soviet attitude to air warfare.

J. W. R. T.

* *"The Soviet Air Force," by Asher Lee. Gerald Duckworth and Co., Ltd., 3, Henrietta Street, London, W.C.2. Illustrated, 207pp. Price 8s 6d.*

HERE and THERE

SPEEDY STOCK: Direct descendants of the 670-m.p.h. Sabre, the North American YF-86D (left) and YF-93A display redesigned noses and bulkier fuselages carrying afterburners for increased speed. The nearer newcomer is powered by the P.W. J-48 (Rolls-Royce Tay) turbojet; its companion a General Electric J-47.

Farnborough, 1950

THE dates of this year's S.B.A.C. Flying Display and Exhibition at Farnborough have now been announced as September 5th-10th inclusive. As in 1949, the first day, a Tuesday, will be reserved for technicians; on Wednesday, the 6th, and the two following days, the Society's guests will be admitted; the general public will be able to attend on the Saturday and Sunday.

Naval Jets' Night-flying

SIXTEEN jet fighters (type unspecified) recently made successful landings at night on the American carrier *Valley Forge*, with the aid of fluorescent signalling apparatus. The U.S. Navy claims the operation to be the first of its kind.

Adventurer and Aiglet

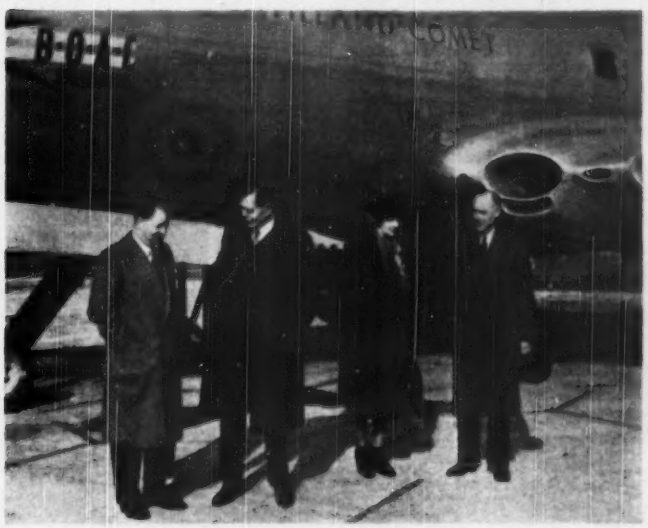
AUSTER'S latest four-seat light aircraft, the Autocar, is the subject of the pilot's report with which this issue opens. Less familiar names in the Auster range are those applied to two other Gipsy-Major-powered types, the Adventurer (a four-seater of which a few were produced to an Australian order before the Autocar appeared) and the Aiglet, a forthcoming three-seater which should be of special interest for high-altitude overseas operation, since it has a particularly favourable power-weight ratio.

Jet Escort

TWELVE Fighter Command Vampires were due to escort the French President and Mme Auriol during their Channel crossing in the steamer *Arromanches* on Tuesday. S/L. A. G. Rawlinson, D.F.C., led the formation, which was drawn from Nos. 54, 72 and 247 Squadrons.

Air-Race Entries

ENTRY forms and details of the regulations for this year's National Air Races are now available from the Secretary-General of the Royal Aero Club, 119, Piccadilly, London, W.1. Dates and places are: King's Cup, Wolverhampton, June 17th; S.B.A.C. Cup and Air League Cup, Sherburn-in-Elmet, July 22nd; Grosvenor Cup and Norton Griffiths Trophy, Woolsington, July 29th; Kemsley Trophy, Fairwood Common, August 19th; Siddeley Trophy, Baginton, September 2nd.



NEW HEIGHT: Marshal of the R.A.F. Lord Trenchard and Lady Trenchard (centre) last week flew for an hour in the D.H. Comet, which reached a height of 40,000ft. They were accompanied by Sir Geoffrey de Havilland (right) and Major Frank Halford.

Wyvern Trainer

THE type suffix T.3 has been allocated to the advanced trainer version of the Westland Wyvern T.F.2 deck-landing torpedo fighter. As in the T.F.2, the power plant is an Armstrong Siddeley Python turboprop.

To Test Jets

TO help Armstrong Siddeley Motors, Ltd., with their "increased amount of research into prop-jet and pure-jet aircraft," the company's staff of test pilots has been augmented by the engagement of F/L. Tom Prickett, who has been granted an early release from the R.A.F. for the purpose, after 9¼ years' service. During the war he served Nos. 80 and 130 Squadrons, and for the last two years has been an instructor in a Meteor Conversion Unit.

F/L. Prickett.

1,800-mile Let-down

IN a recent New York lecture, Dr. Hsue-Shen Tsien, a professor at the California Institute of Technology, outlined a rocket-propelled airliner capable of crossing the United States in one hour. Weighing 50 tons at launching, the aircraft would use 37 tons of fuel to cover a distance of 1,200 miles and climb to a height of 27 miles. It could then complete a 3,000-mile journey by gliding to its destination. Its maximum speed would be 9,140 m.p.h., and its landing speed 150 m.p.h.

Schnorkel-Spotter

RADAR equipment capable of picking up reflections from the "schnorkel" breathing equipment of submarines is carried by the Lockheed P2V-4, latest in the Neptune patrol-bomber series. On making contact, the P2V-4 uses newly developed magnetic detection gear and sonobuoys for pin-point location.

Its makers, stating that the new Neptune is capable of handling any submarine encountered, quote a formidable array of armament: torpedoes, rockets, bombs, mines, machine guns and 20-mm cannon. Externally, the P2V-4 is characterized by a large radome slung

HERE AND THERE . . .

beneath the fuselage and wing-tip fuel tanks. Over 150 Neptunes are now in service with the U.S. Navy. A photograph appears on this page.

In Memory of C. S. Rolls

WE learn from Rolls-Royce, Ltd., that a portrait of the Hon. Charles Stewart Rolls is shortly to be presented to the Royal Aero Club. This gesture is inspired by the fact that the great pioneer pilot and racing driver—who met his death in a flying accident in 1910—was a founder not only of the company which bears his name but of the R.Ae.C. itself.

Even the Kitchen Stove

FOOD supplies for ten days, a .22 revolver and a "canned-heat" cooking stove are among the 22 items packed away in a new 24-lb Arctic-survival kit produced by the U.S.A.F.'s Air Material Command. Also included are a sleeping bag, mittens, ski goggles, signalling mirror, waterproof matches, woollen socks, compass, water container, pocket knife and survival manual.

The kit-container, which is attached to the seat sling of a back-type parachute harness, has one side "contoured" and foam-rubber-padded, the pilot thereby being provided with a comfortable seat during flight.

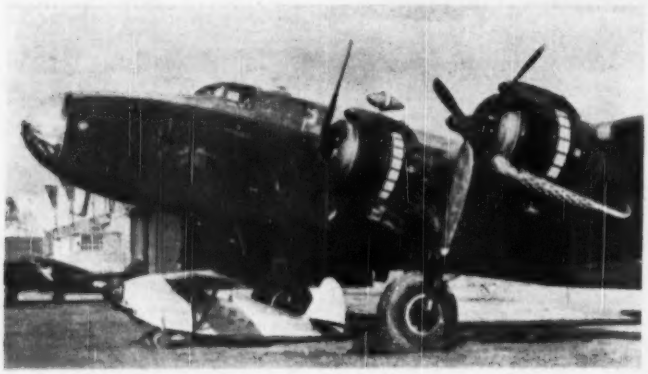
U.S.A.F. Bomber Expansion

AS announced in *Flight* last week, nine bombardment groups of the U.S.A.F.'s Strategic Air Command are to be increased in strength. The exact composition of these units—three of which fly B-50s and the remainder B-29s—has now been announced. Formerly, each group consisted of three squadrons of ten aircraft. Squadron-strength is now to be increased to 15 aircraft, and each group will also acquire a 20-strong squadron of B-29s equipped as tankers for aerial refuelling.

Six bombardment groups are already approaching the full strength of 65, and the remaining three will be built up in the near future. One of the units affected by the expansion programme is the 2nd Group, equipped with B-50s, which arrived in England recently.

OVER THE GOLDEN GATE: San Francisco's famous bridge is the landmark beneath this Lockheed P2V-4, latest version of the Neptune patrol bomber. Some details of the P2V-4, designed for anti-submarine work, appear in the final item on page 307.

BOY SCOUT'S DREAM: As mentioned in an adjacent paragraph, U.S.A.F. pilots operating in cold climates are to be issued with a compact survival kit containing 22 items. It weighs 24lb and is slung beneath the parachute seat-pack.



BUSINESS AND PLEASURE: Airspeed test pilot R. E. Clear owns this diminutive Comper Swift, one of two now flying. Dwarfing it is a Handley Page Halifax, used, until recently, for towing Horsa gliders on test flights from Christchurch.

NEWS IN BRIEF

FLYING people who are also sailing and power-boat enthusiasts are reminded that the current (March) issue of *Yachting World* is the Fitting-out Number, the first to be published since the war. In addition to many practical, helpful articles it contains special lists of the season's fixtures.

* * *

In their *Technical Data Sheet No. 4*, Marston Excelsior, Ltd., Fordhouses, Wolverhampton, give a clear exposition of the names and nature of materials used in flexible-tank construction.

* * *

To provide emergency power supplies, 23t diesel-electric generators have been ordered for Australia's airports. The English Electric Co., Ltd., are to supply 200 kW units for the main installations.

* * *

A comprehensive brochure of the Breeze range of electrically-operated actuators has been issued by the Plessey Co., Ltd., Ilford. The publication gives full technical specifications, amplified by line drawings, photographs and performance curves.

* * *

The Pullin Optical Co., Ltd., announce that Mr. W. J. Baumgartner, who was chief designer and technical manager to Voigtlander, and is the inventor of 250 photographic devices, has joined their design department. Mr. Baumgartner designed the first fuel pump for the Junkers Diesel engine.

* * *

Mr. John R. Pheazey, M.I.Mech.E., M.I.P.E., works director of Standard Telephones and Cables, Ltd., and vice-president and European director of manufacture, International Standard Electric Corporation, has been elected president of the Engineering and Allied Employers' London and District Association.

* * *

Henry Wiggin and Co., Ltd., manufacturers of nickel and high-nickel alloys, announce that Mr. John Hitchcock, B.Sc., who since 1946 has been personal assistant to the managing director, Mr. Ivon A. Bailey, has now been appointed to the newly created post of assistant managing director. Mr. Hitchcock was formerly a member of the Mond Nickel Company's research staff.

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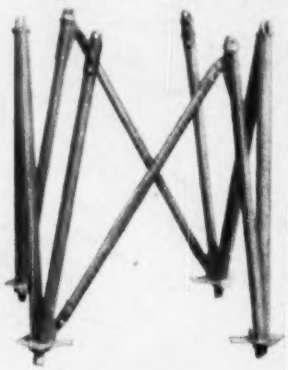

A typical example is the "Mamba" Engine Mounting illustrated.

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HELICOPTER DEVELOPMENT IN FRANCE

Current Types Reviewed by a French Air Ministry Specialist : Assorted Approaches to the Auto-rotation Problem : Progress with Jet-driven Rotors

A REMARKABLY informative paper on French helicopter development as exemplified by current construction was given before the Helicopter Association in London on February 25th. The author was Colonel R. M. Garry, who is engineer in chief of the rotating wing section of the Service Technique Aéronautique of the Ministère de l'Air. The paper was read by Captain R. N. Liptrot (now of the B.E.A. Helicopter Unit and formerly Deputy Director of Helicopter Research, Ministry of Supply) who, we understand, was also responsible for the admirable translation.

Lest the uninitiated should assume from the paper that rotating-wing progress across the Channel has been unimpeded by any of the difficulties encountered elsewhere, it should be remarked that not all the designs mentioned are, in fact, in an advanced state of development. This, however, does not detract from the technical interest of Colonel Garry's review of the various types, which is given in the following pages in slightly abbreviated form. (In the original lecture, it should be added, certain rather detailed descriptions of linkage systems and other mechanisms, here omitted, were illustrated by diagrams.)

BREGUET G.11E

The Breguet G.11E, a helicopter with two co-axial rotors, is the logical successor to helicopters built by the Breguet Company before the war. Weighing 3,080lb with pilot, two passengers, and 26½ gal of fuel, it is fitted with a fan-cooled Potez 9E, nine-cylinder air cooled radial engine developing 260 h.p. It has a tricycle undercarriage. The rotors are three-bladed, each of 28.2ft diameter.

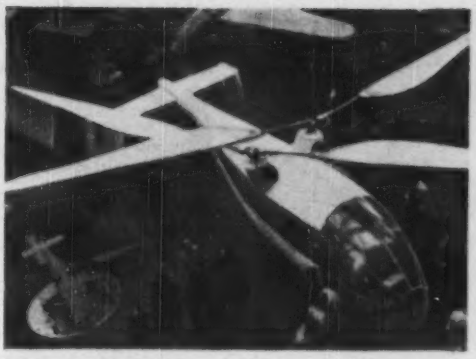
The front fuselage is a light-alloy monocoque structure with two sliding doors, the cabin glazing giving excellent visibility. The rear fuselage, of steel tube, fabric-covered, carries a vertical fin, and a tailplane coupled to the control column in such a way as to suppress once-per-revolution flap in forward flight.

A semi-automatic single-plate clutch controlled by a lever in the cockpit, carries the cooling fan and a roller-type free-wheel. Then follows a double-splined universal joint the shaft of which drives two spiral gears through two pinions. The reduction ratio is 6.5 : 1, the maximum rotor tip speed being 574 ft/sec. The gears drive the two rotors through concentric shafts carried in ball bearings.

Of the blades, which are very stiff, each consists of a steel tubular spar, tapered both as to diameter and thickness, and carrying ribs attached by special clips. There is a dural leading edge and the main covering is by Plymax, which is a three-ply sandwich with an outside skin of light alloy. The blades are tapered and have 4 deg twist. Axes of the flapping hinges intersect at the rotor axes, and hydraulic drag-hinge dampers are fitted.

The control column gives cyclic-pitch control by means of two coupled swashplates, the controls for the upper rotor passing inside the shaft.

Differential collective-pitch variation necessary to compensate the residual torque reaction, and to give directional control when hovering, is not obtained by the swashplates but by displacement of the control support sleeves, which carry an intermediate link. Directional control from the pedals is thus very stable and forces quite normal.



The N.C. 2001 as it appeared at the last Paris Show. A noteworthy feature is the use of closely "meshed" rotors.

A governor driven by the rotors and sensitive to both angular speed and positive acceleration, controls a hydraulic jack which moves the swashplates axially. Centrifugal force acts on bob-weights, and the angular acceleration on a wheel driven at high speed by a planetary train of gears. By controlling a secondary hydraulic distributor the wheel immediately increases pitch on the slightest acceleration of the rotors. In addition an over-ride mechanism allows the main distributor of the governor to be used as a servo to increase collective pitch at the will of the pilot, but not to reduce it. A separate "over-ride pitch lever" is provided for this purpose. This arrangement not only permits the rotor kinetic energy to be used in a forced landing, but also prevents collective pitch being reduced below a predetermined level in the event of power-unit failure close to the ground. When set at the limit of its travel it still permits the governors instantaneously to reduce pitch to the auto-rotative setting in the event of engine failure, or complete closure of the throttle.

A linkage with the throttle lever, by acting on the governor spring, provides for reduction in rotor r.p.m. when the throttle is reduced.

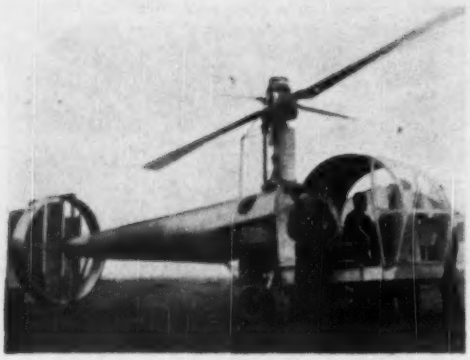
N.C. 2001

The N.C. 2001 helicopter has been designed by the rotating-wing department of the Société Nationale de Constructions Aéronautiques du Centre under the direction of the chief engineer, M. René Dorand. It is of the symmetrical configuration with two intermeshing, laterally disposed two-bladed rotors, either driven by the engine or turning freely in auto-rotation. It provides side-by-side seating for a crew of two, and a cabin accommodating three passengers. Total weight is 5,940lb, and weight empty 4,550lb. The hovering ceiling outside the ground cushion is 8,200ft.

The undercarriage is of the tricycle type, the wheels being fully castoring through 360 deg.

Power for the N.C. 2001 is provided by a Gnome Rhone type 12S developing 575 h.p., at take-off, and the reduction-gear ratio between engine and rotors is 15 : 1. The normal reduction gear of the engine is replaced by a special gearbox driving two oblique shafts, in a vertical plane and parallel to the rotor axes, through a clutch, free-wheel and two sets of bevel gears. The two drive shafts, each of which has a universal joint at each end, convey the drive to two rotor gearboxes symmetrically disposed about the vertical, and containing a double-pinion drive to the two rotor shafts which carry the pitch-control swashplates. The rotor shafts are suspended hydraulically in a mounting whose inclination longitudinally with respect to the fuselage is automatically adjusted as a function of forward speed.

An oil connection between the two diaphragmed com-



The Nord 1700 has an unusual tail-rotor arrangement.

HELICOPTER DEVELOPMENT IN FRANCE . . .

partments forming the flexible suspension permits free differential movement between the two rotor shafts, while simultaneous movement of the two is damped as is necessary in order to transmit longitudinal and lateral control movements.

The rotors are attached to the drive shafts by universal joints, the drag hinges of which are damped by two hydraulic dampers common to the two blades, one of which damps simultaneous movement while the other damps any differential movement between the blades. Pitch change of the blades by rotation about a pitch-changing hinge is provided by a combination of torsion bar and mechanical and rubber buffers.

Lateral and longitudinal control are obtained by cyclic-pitch variation of the blades of the two rotors. Pitching control by movement of the control column causes corresponding tilting of the two swashplates governing the blade angle. Displacement of the column to the right causes a greater lateral tilt of the swashplate of the starboard rotor. This is to ensure that the blades of one rotor cannot foul the hub of the other rotor.

Directional control by pedals is obtained by differential variation of the collective pitch of the two rotors, and by longitudinal and lateral tilt in opposite senses of the virtual axes of the rotors. This is done in order to suppress all interaction between the directional control and the control about the other axes.

A single lever controls simultaneously the pitch and throttle opening by an electrically operated linkage. In the event of power-unit failure, the reduction in engine torque, indicated by a torque-measuring device, operates a small electric jack which moves the single control back to the zero setting. The pilot can over-ride this control. In addition the blade attachment is so arranged that there is a reduction of incidence when the coning angle of the blades increases, so eliminating any danger of loss of rotor speed.

NORD 1700

This is an experimental two-seater undertaken as a private venture by the Société Nationale de Constructions Aeronautiques du Nord, under the direction of M. Bruel. The object was to test a number of novel arrangements designed to simplify both construction and flying.

Principal characteristics of the Nord 1700 are: All-up weight, 2,050 lb; engine power, 160 h.p.; rotor diameter, 32.8 ft; length (without rotors), 23.94 ft; height overall, 10.8 ft; undercarriage track 8.5 ft.

In the interest of simplicity and lightness a two-bladed rotor is used. Each blade, in which chord and aerofoil section are constant from root to tip, is built up of a solid spar, ribs, nosepiece and a thin sheet skin, all in duralumin. These components are assembled by clamping together, and no rivets or bolts are used except at the hub attachment.

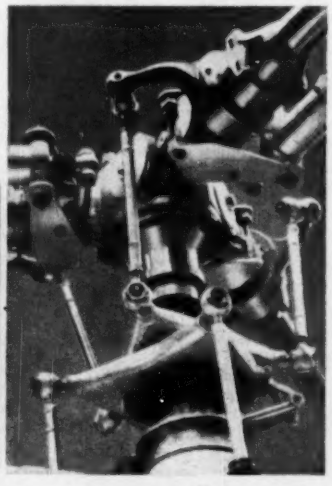
The engine is a Mathis G7.R air-cooled radial developing 160 h.p., and mounted with its crankshaft vertical. The Nord 1700 is the first French helicopter to have the engine installed in this attitude.

At the after end of the helicopter is an unusual arrangement—the subject of a Bruel patent—a fan to blow a current of air to the rear over vertical and horizontal control surfaces. This fan is mounted inside a cowling ring which screens it from gusts when hovering and from variations in the rotor downwash, so increasing its efficiency, and at the same time giving protection to ground personnel. This tail arrangement is used not only to compensate the torque reaction from the rotor; the vertical surfaces provide directional control, and the horizontal surfaces longitudinal control, and it is thus possible to eliminate the disadvantages of complicated arrangements such as cyclic-pitch control. Another advantage is that the helicopter can be taxied with the main rotor stopped.

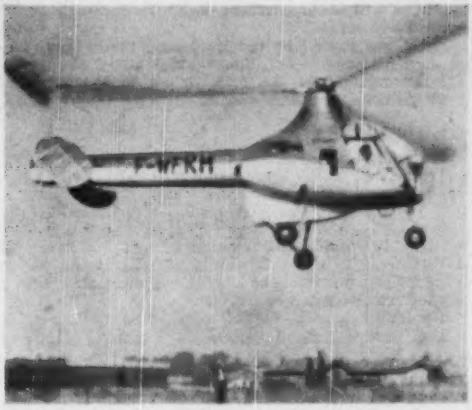
Deflection of the vertical surfaces is controlled by a hydraulic torque measuring device so that the rotor torque reaction is compensated automatically.

The rotor is fully articulated and without drag-hinge dampers. Vertical vibration is damped out by a pneumatic system located at the top of the rotor. On starting up, and until a predetermined rotational speed is reached, the blades are held rigidly in forks and at zero pitch, so minimizing the effect of gusts. When r.p.m. reach the safe figure the blades rise, free themselves from the forks and automatically take up the correct pitch-setting. This same arrangement also automatically puts the rotor into autorotation if the engine fails. Rolling manœuvres are affected very simply by displacing the rotor head parallel to itself laterally.

Auxiliary blades, called "pilot blades" are fitted 90 deg



A twin tail-rotor system is employed in the S.E. 3110. (Right) Close-up of main rotor head.



Simple mechanical layout—afforded by the use of a jet-propelled rotor—and a clean fuselage design characterize the S.O. 1110. A radial engine drives the Turbomeca compressor.

ahead of the main rotor blades, and regulate the pitch of the latter as a function of their own flapping. This reduces flapping of the main rotor blades and so reduces vibration.

The rotor head can also be displaced parallel to itself in the longitudinal sense to trim for c.g. variation and take load off the stick. Correction of lateral displacement of the c.g. when carrying pilot and passenger of different weights is made automatically by mounting the seats on a balance linkage coupled to the lateral control.

Tests of the Nord 1700 during the past year have demonstrated that there is practically no inter-action of one control on another, this being due to the tail arrangement and the automatic correction for torque reaction.

S.E. 3110

The S.E. 3110 helicopter has been designed by the rotating wing department of the Société Nationale de Constructions Aéronautiques du Sud Est, under the direction of MM. Marchetti and Renoux and its general layout has been determined by the following considerations: (1) to obtain as high a rate of climb as possible; (2) to land in auto-rotation with as low rate of vertical descent as possible.

Other performance characteristics, and in particular high-speed performance, have been controlled by these two considerations and the designers have tried to ensure that the maximum power of the engine can be used, without any limitations being imposed by vibration, by avoiding stalling of the retreating blade even when flying at altitude.

A monocoque fuselage is used, giving low drag for minimum weight and maximum useful volume. A Salmson GNH nine-cylinder air-cooled radial engine (203 h.p. at take-off) is mounted with crankshaft vertical, giving low installed power-unit weight per h.p., steadier torque, and lower height than would be necessary with an in-line or flat engine. This arrangement makes it possible to arrange a large cargo compartment under the c.g.

Controls are similar to these already tried out on the S.E. 3101, with the addition of trimming by means of longitudinal cyclic-pitch control. Simplification of pilotage has been obtained by adequate linkage of controls in order to obtain automatic correction of torque reaction and pitch/throttle co-ordination.

The engine is bolted directly on to the lower face of the transmission box (which is of welded steel and provides the support for the engine/rotor assembly) and the box itself is attached to the fuselage by a pyramid structure of welded steel tubes. The transmission box contains the gear trains driving the two cooling fans; a centrifugal clutch; a double epicyclic reduction gear; a pawl-type free-wheel; the gear train for the tail rotor drive; and the main rotor-drive shaft.

Drive for the tail rotors is *via* an oblique shaft in the fuselage, an auxiliary multiplier drive with pick-up for the rev-counter drive, and a long shaft extending to the tail and supported in four floating bearings. The tail unit consists of a gearbox carrying two struts on which the two two-bladed rotors are mounted.

Pitch/throttle anti-torque linkage is provided to ensure as good co-ordination as possible between the main rotor pitch, engine power, and tail-rotor pitch, and so make it unnecessary for the pilot to have to make constant adjustments to throttle and tail-rotor pitch. The system is based on the fact that over the range of speed used the engine torque only depends on the extent to which the throttle is opened. Its novel feature lies in a direct connection between the anti-torque controls and the carburettor lever, so arranged that the torque correcting movement is proportional to engine torque, and in a linkage between the pitch lever and the motor cycle throttle grip providing: (1) Starting and warming up the engine by rotation of the throttle grip at low pitch; (2) in flight, maintenance of constant rotor speed (or one slightly increasing with pitch) when the collective-pitch lever alone is adjusted; (3) adjustment of rotor speed by the throttle grip. There is no action of the pitch lever on the throttle or anti-torque controls when the throttle grip is closed (i.e., energy landing in auto-rotation).

S.N.C.A.S.O. JET ROTORS

The rotating-wing department of the Société Nationale de Constructions Aéronautiques du Sud Ouest, under the direction of M. Paul Morain, has devoted itself to the development of jet-propelled helicopters, a type which is, of course, the subject of considerable research all over the world. Many have succeeded in flying, the first in Austria towards the end of the war, others in America during the last two years. The principal characteristic of jet-propelled helicopters is the absence of a mechanical drive to the rotors, the blades instead being driven by gases expelled from nozzles at their tips.

This simplification brings the benefits of low first cost and low maintenance cost because it does away with clutches, free wheels, and gears operating under very severe conditions. Moreover, single-rotor mechanically driven helicopters have to have some torque compensating device such as a tail rotor, which causes a pure loss of some 10 per cent of the engine power and can be the cause of many mishaps when manœuvring near the ground. Jet propelled types are quite free from this disadvantage. To offset the quoted advantages, the jets have the disadvantage of using more fuel—though this, in turn, is compensated by the increased useful load and

A blade-tip jet unit (above) and rotor head of the S.O. 1110.

HELICOPTER DEVELOPMENT IN FRANCE . .

reduced maintenance cost resulting from simplicity.

The line of attack chosen by S.N.C.A.S.O. is to have an engine or gas turbine driving a compressor in the fuselage. The compressed air is passed through the hub, which has rotating joints, and is then directed through the blades to combustion chambers located at the blade tips. The fuel fed at low pressure into the hub is then delivered by centrifugal force along the blades, to be atomized under very high pressure by the jets in the combustion chambers. It is ignited by a spark plug and the products of combustion are ejected through nozzles, so giving the propulsive force which drives the rotor.

This scheme of using a compressor has the advantage of burning less fuel than the alternative ramjets or pulsejets which have been developed in America. It has a further and very important advantage in that the drag of the small reaction units at the blade tips is negligible when they are not in operation. Any failure of the jets, therefore, does not interfere with the auto-rotational characteristics of the rotor, and the aircraft can land with complete safety, just like a gyroplane. In the case of ramjets and pulsejets the problem of satisfactory auto-rotation has not yet been solved owing to their high drag.

Mounted on a special or universal joint the hub is free to oscillate. It can therefore tilt so as to lie in the plane of rotation, so reducing to a minimum the displacement of the blades relative to the hub. This arrangement, plus the fact that the hub is not subjected to any torque, makes it possible to do without drag hinges with all the difficulties of bearings, dampers, etc., which they involve. The blades are attached to the hub by two leaf springs, located one on each side of the tubular spar extension, which serves at the same time as an air duct and a droop-stop. These springs provide the equivalent of flapping hinges, and their flexibility in torsion allows blade-pitch change by a conventional spider arrangement.

Blades are of composite wood and metal construction assembled by glueing, the hollow spar (which is of duralumin and of elliptical cross-section) being surrounded by hardwood with a balsa trailing edge. The whole is fabric-covered and enamelled.

Directional control by pedals operates two rudders, one on each side of the tail, whose hinge line is at 45 deg. The downwash from the rotor acting on these rudders gives adequate directional control when hovering.

S.O. 1100 ARIEL

This is the experimental machine commenced in 1946 and which made its first ground-running trials in 1947. Several flights were made during 1948 and in the spring of 1949 the final phase of testing was reached and has now been completed. The thermo-propulsive system is now working very well, and the aircraft has shown good manœuvrability and excellent stability characteristics. It is particularly free from the vibration to which all mechanically driven helicopters are subject.

A Mathis G.7 seven-cylinder radial developing 160 h.p. is fitted, and it drives a Turbomeca compressor through a step-up gearbox. The gross weight is 1,870 lb.

S.O. 1110 ARIEL II

This two-seater has an engine/compressor unit consisting of a Mathis G.8 vee-eight engine developing 200 h.p. and a Turbomeca compressor. It has the same rotor, 35.8 ft in diameter, as the S.O. 1100. Empty weight is 1,595 lb. As normal gross weight is 2,475 lb the useful load of 880 lb is thus 35.5 per cent of the gross weight. The estimated performance at a gross weight of 2,475 lb is: Maximum speed, 107 m.p.h.; vertical rate of ascent, 295 ft/min; hovering ceiling, 4,900 ft; cruising speed, 85 m.p.h.; best climb, 985 ft/min; normal cruising range, 150 miles. For a still-air cruising range of 62.5 miles the payload, including pilot, is 660 lb at normal take-off weight. This aircraft is now undergoing flight trials.

This year a three-seater version (the S.O. 1120) with a Turbomeca gas turbine/compressor unit will be completed. The ratio of useful load to gross weight will be increased to 57.5 per cent and the general performance will be higher than that of the S.O. 1110.

PROUD RECORD

THE author who sets out to write a book round a story of an industrial achievement, however great or historical that achievement may be, sets himself a formidable task, for unless he be a master of his art he may well find that he has produced little more than a glorified publicity brochure. Harold Nockolds, in the new, post-war edition of his classic history of Rolls-Royce,* has avoided all the pitfalls, and the result is a story that stands very firmly on its own merits.

Here we have, again, the fascinating story of the birth of the great firm, and of the building of its sturdy foundations by Henry Royce (who started his working life as a telegraph messenger), the Hon. C. S. Rolls (to meet his death, in the year 1910, in a flying accident), Claude Johnson, and a few dependable benchmen. There follow chapters which will have a nostalgic appeal to all who are old enough to remember motoring and "motors" in the days before the Kaiser's War; then comes the story of Royce's intensive work, in 1914, on the design of his first aircraft engine—in which he was assisted by A. G. Elliott and E. W. Hives, both of whom were destined to direct the fortunes of the great firm in later years. So successful were they in their planning, and so efficient the subsequent production effort, that R.-R. engines powered more than half the British aircraft used in 1914-18.

Equally interesting, both to motoring and aviation enthusiasts, is the story of the inter-war years, with the Schneider Trophy Races (for which the famous "R" engine, forebear of the Merlin, was designed) and land-speed records as high spots.

Few readers of *Flight* will need reminding of the contribution which the great Derby firm made to the Allies' winning of Hitler's War, but in these newest chapters of Mr. Nockolds' book the story is told in detail for the first time. The firm's part in the Battle of Britain is, perhaps, best summed-up in the words of Sir Archibald Sinclair, who was Air Minister at the time. Recalling those fateful days of 1940, he said, "I remember one night being called out of a meeting of the Defence Committee to be told that German bombers were approaching and that the radio beam which directed them was laid on a line which passed over Derby. We would far rather have heard that the beam was laid on Downing Street, or that parachutists were dropping in St. James's Park. For all our fighters in the Battle of Britain were powered by Rolls-Royce Merlin engines . . . ."

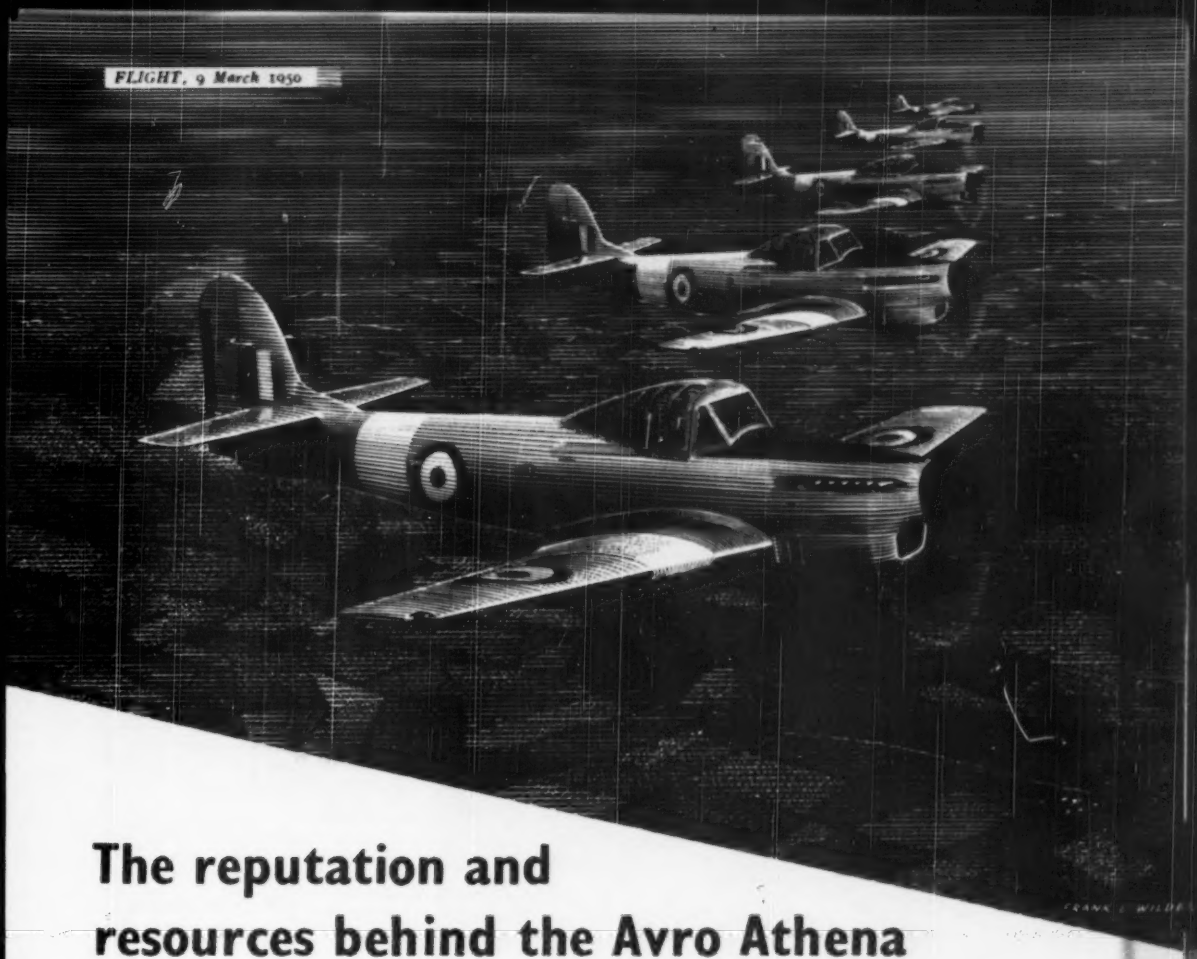
The book leads us on through the war years and so to the jet era; and the author ends with an unexpected but illuminating chapter on the company's finances. ". . . it might be deduced," he says, "that the directors . . . must have made vast fortunes, but such an assumption is not borne out by the facts." At his death, Sir Henry Royce left a sum much smaller than the estate of many a motor-car manufacturer whose products are now almost forgotten. On March 29th, 1949, Mr. Nockolds reminds us, £145,000 of the £1,150,000 issued capital was made up of "workers' stock," held by employees who are thus able to reap as they sow.

* "*The Magic of a Name.*" *by Harold Nockolds. Illustrations from paintings by Roy Nockolds. G. T. Foulis and Co., Ltd., 7, Wilfort Lane, London, W.C.2. Price 25s.*

FAIREY APPRENTICES' SKILL

DURING the past year an impressive list of successes has been gained by members of the apprentice training scheme in the Hayes and Stockport factories of the Fairey Aviation Co., Ltd. Apprentices in these works obtained 38 Ordinary National certificates and 17 Higher National certificates in mechanical engineering. Four gained City and Guilds intermediate certificates in machine-shop engineering and three achieved their B.Sc.(Eng.). P. J. Bell (Hayes) obtained three distinctions and qualified for one of the Higher National certificate prizes awarded to the best 5 per cent of the H.N.C. candidates over the whole country.

Apprentices A. Blower and J. R. Wright (Stockport) were awarded three-year scholarships to the Northern University and to Manchester University Faculty of Technology respectively. Another Hayes apprentice, Denis Howe, a student of Southall Technical College, was awarded the Hele-Shaw prize and gold medal, the supreme award of the Council of the Institution of Mechanical Engineers. Mr. Howe was subsequently awarded an S.B.A.C. scholarship to the College of Aeronautics.



The reputation and resources behind the Avro Athena

The foundation of Avro excellence of design and workmanship were laid during the early years of the present century, and the fact that hundreds of thousands of airmen throughout the world have been trained on Avro aircraft provides ample evidence of the unrivalled reputation won by Avro trainers over the years.

In no small measure is this reputation due to practical knowledge born of experience and the painstaking attention to detail which is so well exemplified in the new Athena advanced trainer.

When it comes to quantity production the vast Avro capacity is backed by the wide-spread resources of the Hawker Siddeley Group.

The AVRO Athena can be supplied with either piston engine or propeller turbine.

AVRO

ATHENA

ADVANCED TRAINER

A V ROE & COMPANY LIMITED · MANCHESTER

Branch of the Hawker Siddeley Group

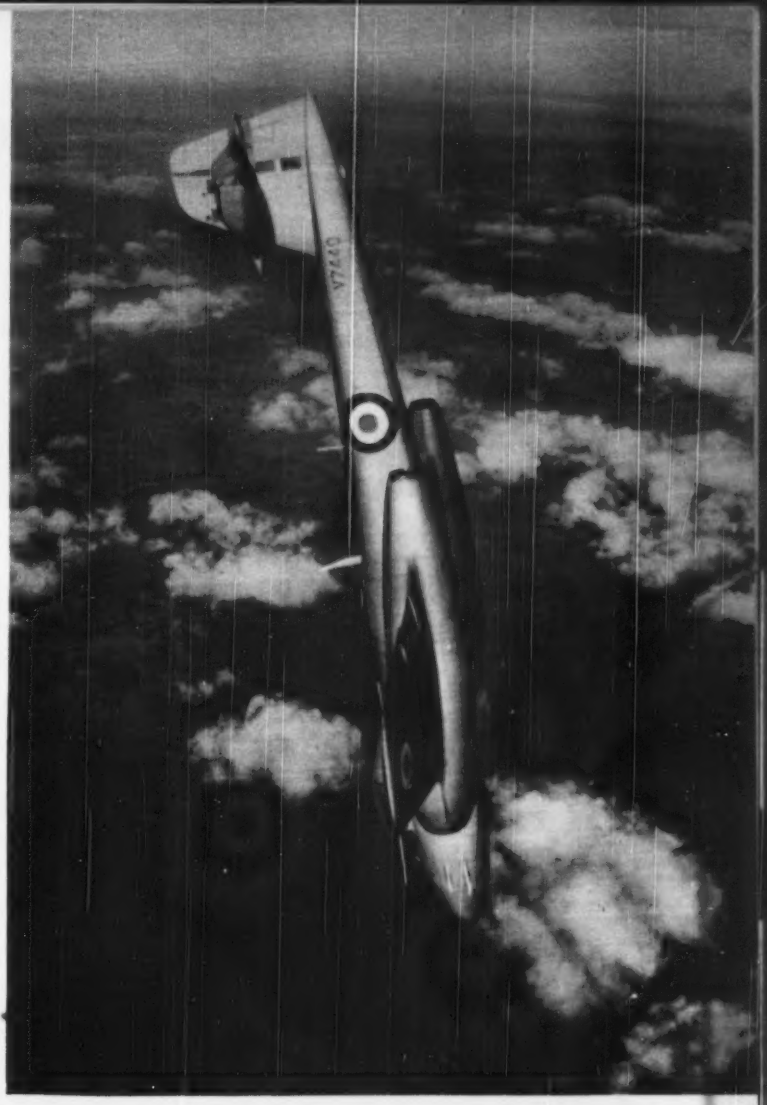
More than 9,000 de Havilland propellers are in daily service with operators throughout the world

More than 100 commercial transport operators, including a considerable number of the major air lines, based in more than 40 countries, and more than a score of national air forces, not to mention hundreds of flying clubs, schools and private owners of aircraft, are users of de Havilland propellers

DH PROPELLERS

". . fantastic tricks before high heaven.."

Shakespeare, "Measure for Measure"



READERS, we feel, will join in congratulating Gloster photographer R. Adams on securing these unique impressions (for which breath-taking, for once, is an apt description) of a Meteor 8 fighter looping in formation with a Mk. 7 trainer. Though subject to considerable *g*, he wielded his Speed Graphic with confidence, in the knowledge that his "driver" was J. Zurakowski—one of the world's foremost aerobatic exponents—while the Mk. 8 was in charge of Capt. F. J. Vijzelaar, an experienced Dutch Service pilot "on loan" to the Gloster Company. The pictures are also a tribute to the control qualities of the Meteor—qualities inherent in all Gloster fighters for nearly thirty years past. Like the Meteor, the Grebe, Gamecock, Gauntlet and Gladiator were standard R.A.F. equipment in their time, and on these types the technique of formation aerobatics was largely evolved in the Service. Zurakowski's performance on a Meteor 8 in last year's S.B.A.C. display was generally considered to be one of the finest pieces of demonstration flying yet seen in this—or any other—country.

AIR FRANCE GOES AHEAD

An Air France hostess at Nice receives orchids for delivery in London the same day.

Increasing Returns and a Progressive Policy : An Airline's Share in a Nation's Economic Recovery

THE recovery of France in most spheres of her national economy is a noteworthy development of the past fifteen months in Europe. That civil aviation has played an honourable part in this recovery is incontestable. It is significant that the Kuhlman Prize for 1949, awarded to the French enterprise showing the greatest advance in trading, scope and efficiency since the Liberation, was (as reported in *Flight* at the time) gained by Air France. Financially, the returns in every department had risen by a very substantial margin over those of the preceding year and it is believed that the Company's balance sheet, when published, may show that revenue came within an even nearer point of parity with outgoings than the 95 per cent recorded for 1948. For the national airline of a country responsible for a vast overseas Empire and compelled to operate many unremunerative schedules for the sake of prestige and political expediency, such results are nothing if not remarkable, especially when it is remembered that France has at present to acquire the principal units of her commercial air fleet from dollar sources.

THOUGH many of the developments referred to in this article have been recorded in our "Civil Aviation News" pages during the past year, their collation here by a special correspondent serves to give a convincing picture of the high level of all-round efficiency attained by France's national airline.

The plans of Air France for 1950 are far-reaching. Limited only by possible delays in deliveries of new aircraft, they include new services from Paris to Montreal and Djibouti, and the tightening-up of the network covering the principal towns of Germany. In addition, it is intended to increase considerably the frequency of services linking Paris with America, Great Britain, Egypt, North Africa, Palestine and the main metropolitan centres within France itself.

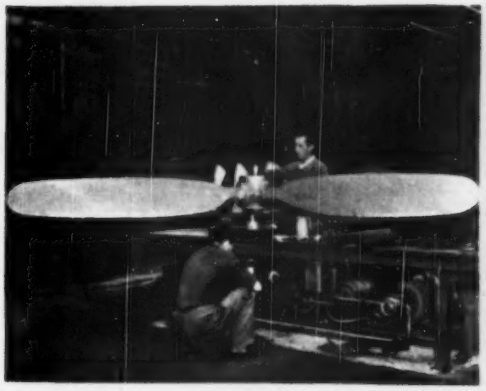
In broad principle, the types of machines best adapted to the needs of the various lines will be put into service. As new Constellations come along, they replace DC-4s on the long-distance runs; 44-seater DC-4s are called in to supplement or supplant the 33-seater Languedocs on the European lines. Dakotas gradually take the place of Ju52s still in use on the African subsidiary lines, especially in Madagascar. This procedure will ensure a gain in the potential flying hours per unit in the company's fleet. In 1949 an important increase in flying hours was achieved—more than half an hour a day in the case of the DC-4s—representing thousands of flying hours in the course of a year.

Standardization of aircraft is the object in view. The four Constellation 749s which figured in Air France's fleet have been sold and replaced by four of Type 749, while six new 749s from Lockheed are expected within the next two months. This will bring the fleet of 749s—the most up-to-date model—to nineteen, while ten new DC-4s and C-54s are also on order.

Air France's attachment to American machines for heavy work is simply based on the fact that the company considers them to be the most economical for the job. Prototypes of purely French design and construction are, however, kept well up on the list of requirements and orders will be placed as soon as practicable for a number of S.O.30P *Bretagne* and Breguet 763 *Deux Ponts*, both of which excited admiring comment at last year's Paris Aero Show. The *Bretagne* is considered admirably adapted to the European section of Air France activities, for linking London and other European cities with Paris, while the *Deux Ponts* is regarded as ideal for freight and passenger work on the ever growing air lines to North Africa.

The regularity of operation and the optimum utilization of aircraft rest essentially on keeping this equipment in perfect

To bring dollars to Paris : a "trainload" of hats and dresses for despatch to New York.



In the airscrew shop at Orly, near Paris, the company's principal maintenance base, where a staff of 1,500 workers is employed.

DC-4s are progressivaly being transferred to the European runs as new Constellations go into service on the world routes.

condition. It is for this reason that so much attention is paid to maintenance. More than half the ground staff of Air France are employed in four great establishments where the overhaul and upkeep of equipment is concentrated—the overhaul section at Orly airport, the engine shops at Courbevoie and the depots at Toulouse and Marignane (Marseilles).

Orly is the centre where the operational control and maintenance of all the company's machines is carried on. Here alone, 1,500 technicians are employed. Courbevoie, which was opened in July, 1949, is a workshop of specialists in the major overhaul of the Wright engines used in the Constellations. Soon it will be able to cope also with the Pratt and Whitney engines of the DC-4s. At Marignane and Toulouse, the periodical complete reconditioning of DC-4s and DC-3s is the main activity. To these big centres must be added the smaller "top overhaul" services carried out at Orly, Le Bourget, Algiers, Dakar, Saigon, Tananarive, New York, Buenos Aires, Cairo and Lagos. At Le Bourget, even more is done, since practically all the work of upkeep on Languedocs is carried out there.

Behind this force of technicians whose task it is to get the very best out of the fleet and keep it always at top efficiency is an unflagging commercial organization, geared to keep the company on competing terms with old rivals and a host of high-powered newcomers. Their job is to prospect for new zones and new sections of potential customers; to sell air travel and air porterage of mail and freight in competition with powerful rivals; to add new amenities of travel to existing comfort and improve on comfort by substituting luxury; and to make it easier and simpler for freight customers to send their goods by air.

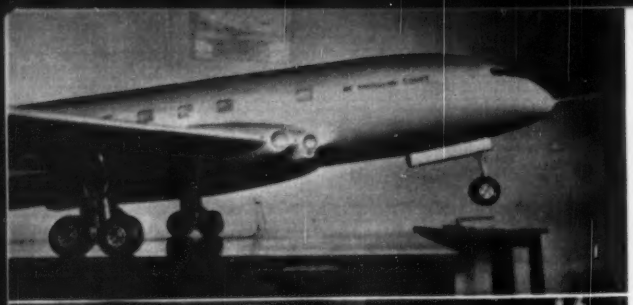
Around the world Air France has established 70 offices and stations, all directly owned or controlled by the company, while many more offices and stations are used conjointly with other operators by mutual arrangement.

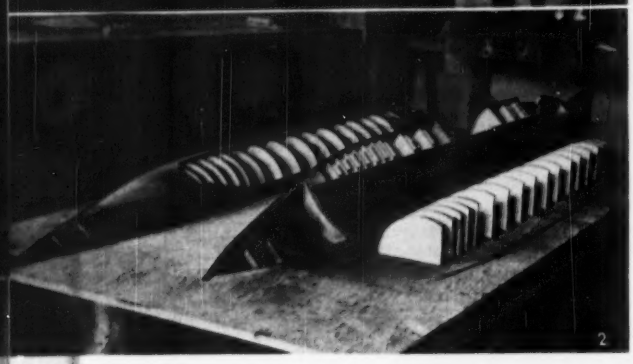
Coming down to figures for 1949, there was a 20 per cent increase in passenger-kilometres flown, 15 per cent in mail-kilometres and 50 per cent in freight kilometres. Although the number of kilometres flown did not exceed an increase of 7½ per cent, traffic *kilométrage* has increased greatly. This means that the average load per aircraft has gone up with a consequent rise in financial return. The average ratio of load to capacity during 1949 was about 74 per cent as compared with 60 per cent, which is generally considered reasonable.

Air France is reaping the harvest of diligent and creative enterprise and is keeping in the van of France's recovery.

The Constellation 249s have now been replaced by the Type 749.

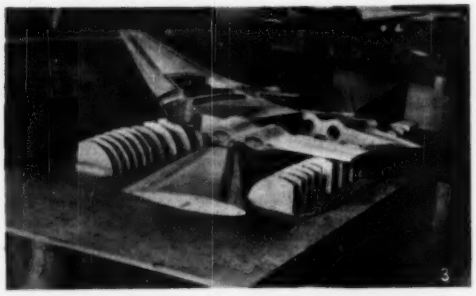
The 44-seater DC-4s are not considered outmoded: several more are on order.





WORKS WITHIN

Craftsmanship in a Model-shop of the de Havilland Enterprise : Scaled-down Aircraft for Exhibition and Research



(1) The model of the D.H. Comet with its production undercarriage.
(2) Formers were a basis for the Comet model's accurate outline.
(3) Dimensional accuracy of sub-assemblies is essential to success.
(4) T. G. Mann works on the model Ambassador's undercarriage.
(5) In the words of the advertisement, " made by hand, one at a time "—W. Armstrong finishing seats for the Ambassador.
(6) The famous Ambassador model in one of its finished versions.
(7 and 8) Miniature mock-up, closed and open : The model as originally made for deciding upon seating layouts for the full-scale Ambassadors.
(9) Main units of the Airspeed model, sprayed by the Metallisation process and used for scaled-down experiments in electrical interference.

A WORKS

APPRECIATION of the miniature in perfection is inherent in all of us. Through the ages, models of transport vehicles, from the child's simple wooden cart to the exquisitely jewelled and executed models made 50 years ago by the Frenchman Fabergé for the Czar of Russia to give away as Easter presents, have delighted the human eye. Models of sailing ships have been built in which every rope is "laid" in fine-gauge silver wire with each knot and splice accurately constructed. Nor is an enthusiasm for working models of locomotives and trains limited to youth.

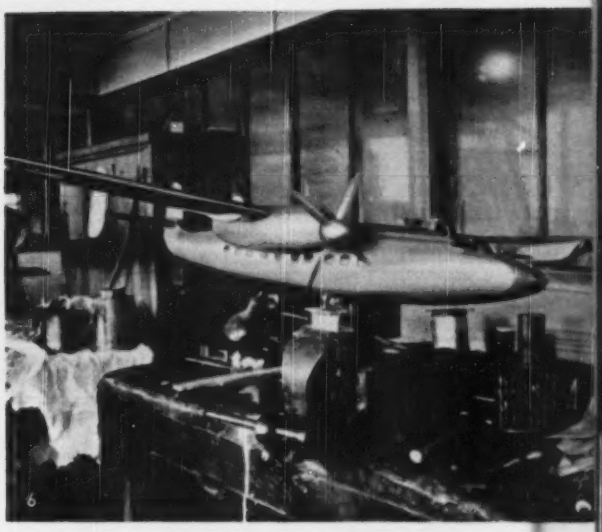
Many who were fortunate enough to see the static exhibition at the S.B.A.C. Display at Farnborough last year made a point of examining the model of the Comet on the de Havilland stand. It showed the new bogie undercarriage which was later to be fitted to the full-scale aircraft. Perfectly articulated and sprung, this undercarriage had each component made of material to exactly the same specification as that to be fitted to the original.

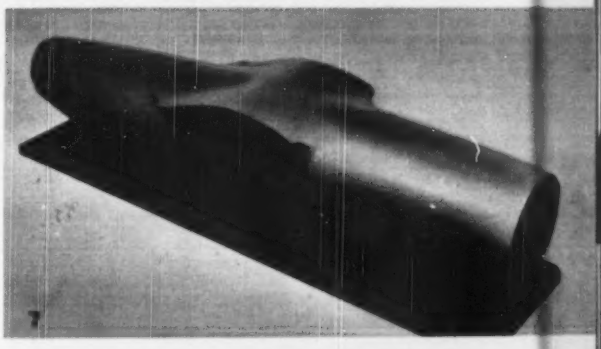
The whole model was constructed under conditions of secrecy in the model shop of Airspeed, Ltd., Portsmouth, which is in the charge of Mr. T. G. Mann, a toolmaker who has turned model-maker. When he left school he went to Airspeeds as a draughtsman but, finding the work unsatisfactory to a mind that demanded fulfilment of artistic endeavour, he transferred his attention to toolmaking. While an apprentice in the toolroom he learnt to apply accuracy to art and, always having had a flair for modelling, he offered to build any models required by the company.

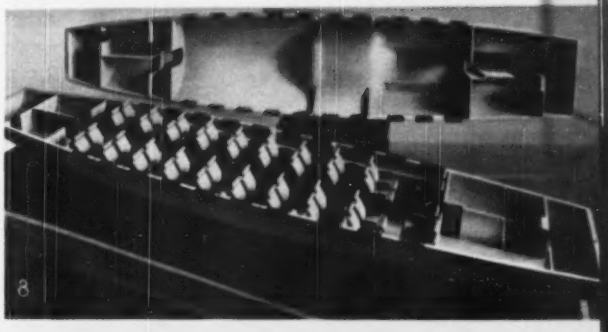
To-day he has a department of his own, with three assistants. It is a complete works in miniature within the works. Drawings are made, jigs built and the models constructed, sprayed and polished.

The majority are, of course, for exhibition, but they also have their utilitarian purposes. The model of the Ambassador started as a small mock-up for seating-layout determination. A nose, wing and tail were then added and it was placed on show at the 1949 S.B.A.C. Display. Now it is partially sectioned, has the new undercarriage and engine cowlings fitted, and it is painted in B.E.A. colours.

An example of modelling for research purposes entailed the building of another model of the Ambassador, which was sprayed with metal, for use in experiments to help the radio people to determine how much electrical interference might be caused by the wings, airscrews, fins or tail and to decide the positioning of suppressed aerials.







APART from its entertaining style, this account constitutes a tribute to the helicopter's aptitude for unusual jobs in out-of-the-way places. It has been prepared by C. Colin Cooper from letters written from Africa by the crew concerned.

"... the pygmies became accustomed to the helicopter," Village in the Kibali-Ituri Forest

HELICOPTER OVER AFRICA

Sixteen Hundred Miles Across the Dark Continent With a Light Rotating-wing Aircraft : A Film Unit's Experiences

LAST summer, a company called Africa Films, Ltd., wished to make a colour sound-film of wild animals and native life encountered on a three-week safari in Kenya Colony. It was thought that it would be impracticable to move the delicate cameras and sound-recording apparatus through the rough jungle country by any other means than by air. Even if the equipment were parachuted to the location, it would be impossible to move it around from place to place in order to be sure of having it in suitable positions for recording the movements of the wild animals.

It was suggested that a helicopter might be used, first as a spotter for locating the game and best camera-locations, secondly as the conveyor of the equipment to the locations, and thirdly for use on occasions as an actual camera platform for taking air-to-ground pictures. Arrangements were soon made. A "fixed-wing" pilot, Mr. "Bark" Vineyard, was trained on a Hiller 360 helicopter, and in due course he and the dismantled helicopter left for Africa.

They arrived at Leopoldville, Belgian Congo, on the West Coast, and there the machine was assembled under Vineyard's supervision. After test flying, and various preparations for the 1,600-mile flight across Africa to Nairobi, Kenya, the machine was ready to depart on August 28th.

From now on the story can best be told by direct quotations from letters received from Bark Vineyard and from Mr. R. Butcher, the representative of Africa Films, Ltd., who was to be his passenger for most of the trip.

"On August 28th," writes Vineyard in the first letter, "Butcher and I loaded up to fly to Stanleyville (1,000 miles). We had three cans of gas tied on the sides of the machine, and luggage and a few spares tied on top of that, and baggage piled high in the cockpit until we looked like an expedition to the moon. I had figured to make the trip in four days, but it turned out that I did not get there until September 14th—eighteen days."

Butcher himself gives a vivid account of the first half of the journey. We started out from Leopoldville (he writes) loaded like a pack-horse, with a change of clothes, jungle packs, four cans of meal, two thermo-bottles of water, and 21 gallons of spare fuel. We took off at 7.30 a.m. and headed for Stanleyville, a distance of 1,000 miles up the Congo river. We started by following the river out of Leopoldville for approximately 20 miles, until we came to the foothills that lead to the high plateaus between Leopoldville and Banningville, which was our first stop for fuel (170 air miles).

It did not take us long to realize what an undertaking we had set ourselves, because it gives one an odd feeling to be flying in an open helicopter and looking down into canyons that are a mile deep, with only the trees of the jungle to set down on in case of engine failure. [As will be seen from the illustrations, this was the standard open-type Hiller, which would obviously be most suitable for photographic work ; the alternative version has full transparent enclosure for the three-place bench-type seat.—ED.] However, after an hour's flight we found ourselves over the grassy plateaus, flying at an elevation of 300ft above the ground.

I had heard before leaving Leopoldville that a herd of about sixty elephants had been seen recently near our course, and so naturally I was looking for them. Soon we saw a herd of about twenty buffalo near a water hole, and this became a common sight from now on, with occasional antelope between the buffalo herds.

All went well, and we had just spotted the fork of the Kasai and Kwango rivers (where Banningville is located) when, at an elevation of 300ft, the engine went dead and we started dropping earthwards at a rate of around 1,000 ft/min. I could see the elephant grass below getting nearer and nearer when, at about 50ft from the ground, Bark flared the ship to break our descent and we made the finest dead-engine landing in elephant grass (which was ten feet high) that a helicopter ever made.

We both looked at each other and laughed, and, with the same thought in mind, loosened our straps, crawled out and looked at the landing gear. After inspection we found no damage, so we poured in some of our surplus gas and started the engine. All seemed O.K., and we took off. As we rose above the elephant grass I saw six or eight buffalo that had been standing within sixty yards of us watching the procedure. We flew over them as they stampeded towards the Kasai river. In six minutes we were

Approximate route taken by the Hiller helicopter. Shading indicates contours (sea-level areas white); lakes are shown in black.

over the Banningville air strip, and as we landed the whole population was out to greet us (40 whites and 1,000 natives).

After taking some pictures and refuelling we set out for Inongo, 132 miles away. We had set our course 40 deg east and picked up the first emergency landing field as shown on our map, 20 minutes out of Banningville. At this time we were passing over grassy plains and were flying at an altitude of 200ft, and could easily see the giraffe and antelope herds below.

After crossing the Fimi River we noticed a settlement and an air strip which was not shown on our map, but proceeded on course over swamps for approximately 20 miles, when the landscape changed to one of timber and tropical palms. We flew over this for nearly an hour, when we noticed a grassy spot large enough to sit down on; so down we went. The first remark Bark made was "where are we?" After studying our maps for ten minutes we decided that the airport we had seen over an hour before was Kutu, which is at the fork of the Fimi and Lukenie rivers. If this was true we were far off course and were heading into a stretch of wilderness that extended for 250 miles.

Inongo is located on Lake Leopold II, a stretch of water approximately seven miles wide by seventy long, and we felt that if we were on course our flying time from Banningville should have put us within sight of the lake (visibility was bad). We finally arrived at the conclusion that our compass was off and decided (after putting in some reserve fuel) to fly 15 minutes north and, if we did not sight the lake, to hit a course back to the air strip that we thought was Kutu.

We did not sight the lake, and finally turned back. After flying for about an hour over jungle forest we came to an opening, where I spotted a native shack at the edge of the forest. I motioned Bark to set down. He hesitated at first, then swung around and landed within 50 yards of the timber in the clearing.

Well, we had just turned off the engine when about fifty natives started to come out of the forest from every direction. About twelve of them had eight-foot spears with steel heads as sharp as razors. They all stood at a distance until a tall native dressed in short pants and a brown felt hat came out of the village and walked over to the helicopter. (I had seen all this on the movies but I never thought it would happen to me.) He turned out to be the chief, and after ten minutes of signs and drawings on the ground I gathered from his diagrams where Kutu was. He pointed in a direction that was at a 45 degree angle from our course, but I decided that he should know his own jungle.

I had become so absorbed in getting information from him that I forgot all about Bark, and thought that he was at my side, only to turn around and find him sitting in the helicopter with his finger on the starting button. He gave me a wink, and I started backing towards the ship, but just as I started to step in the chief grabbed me by the arm and all the others closed in on the helicopter. He was jabbering away in his native tongue and I finally arrived at the conclusion that he wanted a present, so I reached into my pocket and handed him a 100-franc bill. He took it and made motions that he wanted smokes, so Bark gave him two cigarettes. Thinking that ended the conference, I again started to get in, but once more he grabbed my arm; then he sent a native into the village, and the man soon returned with three eggs, which the chief presented to me. Then he shook hands, called all the women and children from the village, motioned his men back and gave us the high sign to proceed. I grabbed my camera, took a movie, and off we went.

I do not want to convey the impression that these natives are unfriendly, but, just the same, it gives you a funny feeling to be one of two white men alone out in the jungle, not

Bull elephant—with broken tusk—resents the helicopter's low-altitude intrusion on his domain in Park Albert, Belgian Congo.

Mountains and clouds in the Park Albert game preserve, Belgian Congo. Standing by the aircraft is Mr. Christians, one of the wardens

HELICOPTER OVER AFRICA . .

knowing where you are, and surrounded on all sides by natives.

We set course for Kutu as per instructions from the chief, but after twenty-minutes' flying I noticed a landmark that we had flown over earlier in the day. It was a square water-hole, and I'll bet my last dollar that it is the only square water-hole in the whole of the Congo. I knew approximately what our course was when we flew over it before, and in looking in that direction I spotted at the edge of the swamp a native village that we had also flown over before; so I signalled to Bark to change course accordingly. He nodded, and twenty minutes later we were down on the air strip we had seen earlier in the day. The square water-hole had served its purpose in putting us back on course.

In no time there were at least a thousand natives around the heli, and I spotted a white man making his way from a nearby buildings. We soon found that the air strip was Nioki, a private field belonging to a milling company. They were running a mill to make plywood from the jungle forest, and were milling over a hundred different kinds of hardwood, employing about 50 whites and 500 natives.

We did not have enough fuel to start back on our course to Inongo, which was only 72 miles. The milling company had a radio station but could only work with Inongo at 9 a.m. daily. We therefore radioed out next morning and were informed that the Government would send fuel by boat as soon as the authorities at Inongo were authorized to send it.

We waited four days and then decided that I should make my way by boat up the Fimi River for 40 miles, and then up the lake for another 80 miles and get the fuel. So at 10 p.m. on September 2nd I started out with two natives in a small boat for Inongo. I don't know how they navigated the river in the dark as it was so dark you could not see your hand before your eyes, and about 2 a.m. I lay down in the bottom of the boat and went to sleep. At 6 a.m. one of the natives shook me and pointed to Kutu, which is located where the swamps of the lake join the Lukenie River.

We worked our way through the swamps and up the west side of the lake, passing many villages built on the lake shore, and at 2 p.m. reached a mission established across the lake from Inongo. Here we headed across the lake, arriving at Inongo at 3 p.m. or after 17 hours from leaving Nioki. After contacting the administrator of the district it didn't take long to get the gas and start the boat on its return trip. I stayed at Inongo, and about noon the next day Bark arrived with the helicopter. It was then decided that I should proceed by Sabena (which stops at Inongo each Sunday) to Stanleyville, and that Bark should follow with the heli, via Coquilhatville, Basankusu, Lisala, Bumba and Basoko.

* * *

As Butcher's letter stopped there, we may turn to the letter from Bark Vineyard, to continue the story After briefly mentioning the experiences just described he goes

"Soon we saw a herd of about twenty buffalo near a water-hole . . ." Note the shadow of the low-flying helicopter in the foreground.

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P.R16-49

In the heart of the Kenya big-game country : wardens and film men hold a consultation on the helicopter's possible effect on game.

HELICOPTER OVER AFRICA . .

on to mention his solo continuation. I had (he writes) a compass that had been loaned me, but I soon found that it had a leak and was no good. I had a small pocket compass, and that is what took me across Africa. Anyway, to make a longer story short, I finally got to Stanleyville after flying through rain and dust and getting lost several times and having to wait for gas to be sent to me on two occasions.

At Stanleyville I loaded up with enough baggage and gas, 58 gallons total, to make a pack-horse groan. I carried it as far as Nia Nia, about 250 miles. From Nia Nia on to Truma everything was fine except for the engine tachometer generator, which I changed there. All the way across the Congo I ran into very bad dust conditions, heat and rain. Only two of the places I stopped at had hangars, and the rest of the time the ship sat out in the rain.

When I got to the Uganda border I took the blades and tail boom off and loaded the ship onto a truck. We hauled it all the way across Uganda, because they would not give permission to fly at under 2,500ft. We had no way to carry the blades, so we filled gunny sacks with grass and set the blades with their leading edges on these and lashed them down. Those poor blades suffered! The tail boom was lashed to the top of a car and came through without too much damage. Just the other side of Uganda, I put the ship together again and flew it to Nairobi. On the way I went over an 8,600-ft pass. Outside Nairobi I had to cross a 7,000-ft pass, but the wind was so strong and so rough that I had to wait until next morning. At last I made Nairobi all right.

From there we went on safari for three weeks, and the ship behaved beautifully. For the picture, I had to make a landing on a truck ; I got it on O.K. but nearly piled up getting off again. On my way back to Nairobi I had trouble with the same 7,000-ft pass as before, and just about cracked up a couple of times because of down draughts. However, I finally got back to Nairobi again, and now I am all finished. The ship has 98 hours on it and is going to be sent back to the States; as far as I am concerned that helicopter has earned an honourable place in a museum.

I have done very little maintenance on the ship throughout. In the first place it hasn't needed it, and, in the second place, about half of my spare parts were lost on the way from Leo to Stan. When I assembled it at Leo it was just as smooth as when I had taken it apart in the States. When I got to Beni the ship had 59 hours. I tracked and balanced the blades there and found they were as close as you could get them. The tail rotor was just off

At most of the stops, native curiosity soon overcame suspicion and fear. The scene here is Bogoro, Belgian Congo, elevation 6,000ft.

HELICOPTER OVER AFRICA . .

a fraction. That was the first and last time I checked them.

The trip has certainly been an experience, and I have enjoyed every minute of it, even though some of them have been rather trying. After flying right across Africa in equatorial latitudes from Leopoldville to Nairobi, I have come to the conclusion that the Hiller 360 is the best helicopter that was ever built. Any airplane that can stand up and keep going under the kind of punishment that ship took is a damn good airplane. The conditions under which we were operating were about the worst you could imagine. Just about everywhere I went I had dust to contend with. When there wasn't any dust I was flying in the rain or the ship was parked in the rain. I took it apart and hauled it on a truck for 400 miles. I operated in East Africa at an average altitude of 6,000ft and fought strong winds and extreme gustiness. I gave it little maintenance and changed only two parts.

* * *

So much for the pilot's story. From another source we hear of a film sequence that was made on safari with the help of a tribe of pygmies. First of all, word was sent to the tribal head that all his people should come down out of the forest and see the great new bird that would arrive the following Wednesday.

And did they come! The District Administrator, Mr. Braun, said he had never seen so many pygmies together in all his twenty-years in the territory—there were over 200 men and about a hundred women with about as many children and babies. When the helicopter landed the women screamed and ran away while the men's faces showed expressions verging on terror. Soon, however, they gathered around it; men and women alike wore only gee-strings and, while intelligent, they were obviously creatures of the forest. Before the afternoon was over and many flights had been made, the pygmies became quite accustomed to the helicopter, and on the two succeeding days they entered into the spirit of the play and performed like trained Hollywood crowd-scene players.

For the film sequence the chieftan, distinguished by his leopard-skin cap, met the supposedly stranded pilot. The pilot by sign language indicated his need for sleep and food. The chief immediately sent about twenty men and twenty women into the forest to catch and kill an animal for food, while to build them a hut selected a beautiful little lady about 3ft 8in tall. The others brought her wicker sticks, which she pushed into the ground and laced the tops together, leaving a little opening. She sang as she worked and in an hour had the house thatched and the floor covered with banana leaves.

On the third day the pygmies watched the pilot "repair" his engine, and when it finally started they put on a great war dance, going round and round the helicopter. Tom-toms were beaten; men blew wooden whistles; women, often carrying their families on their backs, swayed around chanting weird rhythms. In the final scene, as the helicopter slowly rose, the pygmies all raised their hands over their heads and clapped them in unison as a wonderful farewell. The crew of the helicopter and film unit were presented with tom-toms with genuine elephant's ear drum-tops.

In conclusion, it may be added that the foregoing accounts serve to show the stage of development that the present-day helicopter has reached—the dependability and simplicity necessary in a machine to enable a pilot to fly across Africa on a pocket compass is not often found in conventional aircraft.

AEROBATICS IN EXCELSIS

What is the Seagull's Secret?

SOMEONE had thrown some scraps of bread into the street. It was a cold, frosty day, with the wind from the east. Six seagulls were diving on the scraps and, without actually touching down (although their undercarriages were lowered), were picking them up.

From the fourth storey of a Bloomsbury house we started throwing more scraps: bread, bacon-rind cut into small pieces, fragments of yesterday's joint. As we threw them from the window the gulls circled, swooped or stalled, caught or missed them. As an aerial display, it had pre-war Hendon beaten to a club taxying or landing competition. Gulls joined the circuit until there must have been nearly fifty. We watched their flying.

Only one stunted. Following a piece of bacon-rind down he did a series of falling leaves until *click*, and he had it. That was the only time I've ever seen a bird really aerobat, although I have often watched crows, rooks and gulls.

One exercise was common. A thrown piece comes unexpectedly near. Up goes the head and breast. The feathers on the trailing edge of the wing open and the gull almost stalls. Almost—but not quite. Just as speed begins to drop off the clock, the feathers close, the tail comes up (that, incidentally, is rather astonishing because the head does not seem to fall, but the tail seems to come level with the head) and flying speed is resumed. If the scrap has been missed that gull's had it (in the current jargon) and another's got it.

All circuits were left-handed and, except for very short distances, there was no flying against the circuit though, several times, a gull would swoop over the roof across the circuit, baulk the one just opening his beak for the tit-bit, get it and join the circuit.

Two things puzzled me. A gull would be doing a tightish turn when, suddenly, as if hard rudder had been applied, it would flick around in even a tighter turn and come back on its reciprocal, so that its course was as along the sides and end of a hairpin. Yet, in that flick round, there was not a suggestion of a skid. How did they do it?

The other thing was their turns. To turn in a circle of about ten or twelve feet in diameter each gull put on about 60 deg of bank. Then, suddenly, without loss of height or side-slip or preliminary diving, a three-or four-foot circle would suddenly be made with what looked like the same angle of bank. How was it done? Chewing it over in our pub afterwards, we wondered if the gull opened its trailing-edge feathers on the upper wing and tightly closed those on the wing that was low. They undoubtedly used these feathers as spoilers or slots but, if our reasoning is correct, how was the angle of bank maintained? The lower wing should have come up on the turn.

One very interesting manœuvre was the near miss. Sometimes a gull would hit a scrap without catching it. The scrap would bounce a little forward and continue down. Immediately everything went on. Down came the undercarriage, the tail spread, the spoilers opened, the breast was thrown up and the gull "mushed." As it overtook the scrap, another jab was made with the beak, and another near miss. The operation was repeated until there was a catch. This happened three or four times and to watch it from a distance of about three feet was to see every detail precisely.

Mushing was common, but no gull ever did a real stall turn. In fact, I have only once seen birds do that exercise. That was at Denham, when we were learning to fly. A hard wind was blowing on to the roof of a house and some rooks were playing in the resulting hill-lift. They dived on the ridge-pole, zoomed up with the lift, stalled, turned, dived down and round into the lift again. This went on and on with hardly ever a flap of a wing. I wish I could handle an Olympia like that. N. C. S.

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CIVIL AVIATION NEWS

AUSTRALIAN EXPANSION : Soon to become the subsidiary airport to a new terminal which is now being built at West Beach, the existing site at Parafield, South Australia, is considered to be an important link in the network of internal air services. The three aircraft shown on the tarmac—a DC-4, DC-3 and a Convair 240 are representative of the State-owned Trans-Australia Airlines fleet.

VISCOUNT'S EUROPEAN TOUR

MANY of the major European airports will shortly be afforded a preview of an aircraft which should become a familiar sight within the next two years—the Vickers Viscount, which is to begin the first stage of a European demonstration tour in eleven days' time.

The aircraft is due to leave London on March 20th for Amsterdam, and in the following weeks will visit Brussels, Zurich, Rome and Paris, returning to London on April 6th. Ten days later it will leave again for Copenhagen, Stockholm and Oslo, possibly proceeding to Amsterdam before reaching London on April 27th.

In connection with the proposal for British jet and turbo-prop airliners to visit America, referred to in a leading article last week, the Viscount's tour will, of course, prevent it from participating. It is also announced that the Comet is scheduled for tropical trials at Khartoum next month. It would appear, therefore, that only the manufacturers of the Avro jetliner will be able to take advantage of the American invitation, which was extended by the I.Ae.S.

FUTURE OF PRESTWICK

TO ensure the fullest possible development of civil aviation within Scotland and to provide regular and adequate air communications from Scotland to principal overseas centres, the Scottish Council has appointed a committee to review the plans for Prestwick Airport which were formulated by the Minister of Civil Aviation last October. Lord Clydesmuir, a former Secretary of State for Scotland, is to be the chairman of the committee, and other members are Mr. W. Yeaman, a director of Scottish Airways, and Mr. J. Lang, president-designate of the General Council of the Scottish Trade Union Congress.

The M.C.A.'s long-term plan for Prestwick differs radically from the original scheme approved by Scottish authorities at the end of the war. Under the M.C.A. scheme the terminal buildings are to be moved eastwards instead of connecting with the existing main road and rail system to the west. In addition they lack provision for any extension of the present main runway and render impracticable the possible construction of a future flying-boat base nearby. These plans have already been rejected by the Central Committee of the Scottish Chamber of Commerce.

The Scottish Council considers that the provision of airport facilities to international standards is essential for the development of satisfactory air services, particularly to points overseas. The task before the committee will be to consider and report whether, having due regard to financial considerations, the existing M.C.A. plans meet requirements. The Scottish Council also feels that "the long-continued controversy about Prestwick airport cannot fail to have detrimental results from all points of view, and the best way of meeting this situation will be to appoint a committee of obvious impartiality whose findings will command respect.

"HELIPORT" CONSULTANTS

NOW that public interest in the possibilities of helicopter transport has been re-awakened by the announcement of the B.E.A. Welsh service, it is to be hoped that municipal authorities will take steps to investigate the advantages that similar services could offer them. In this connection, Rotor Services, Ltd., have circularized a memorandum to authorities in all larger centres, setting forth the prospects for the future.

Acting as consultants, the company will, if so requested, undertake to make a complete survey of sites for any designated number of rotor stations, prepare plans for their structure and layout, survey and plan the approach routes, and give expert advice in connection with construction and equipment. So far as operations are concerned, the company will advise on, and negotiate for, the inauguration of helicopter services and assist in formulating the relevant local regulations.

The firm appears well qualified to give such advice, for on its board are such experienced pioneers as A. Cdre. W. H. Primrose, who, as air-mail adviser to the Postmaster-General in 1934, conducted the first experiments with Autogiros for roof-top mail landings. He is assisted by Mr. L. F. Dyer, also a director, who in 1948 made the first roof-top landing in England. On the advisory panel are Mr. Alan Bristow, Air Marshal Sir Roderick Carr, Capt. R. N. Liptrot and Mr. Colin Cooper. Roto Services, Ltd., has its offices at 9, Old Burlington Street, London, W.1.

ANYBODY'S AIRLINERS?

FOLLOWING the decision of the Hong Kong Supreme Court to recognize Chinese Communist claims to 7½ airliners, formerly owned by two Nationalist airlines, regular services between Hong Kong and Communist China are expected to start in the near future. The Court recently dismissed Major-General Chennault's claim to ownership of the aircraft. It will be recalled that (as stated in *Flight* of January 12th), he had purchased the Hong Kong assets of the two Nationalist companies when they transferred their operations to Formosa last autumn. Since then the aircraft have been in the custody of the Hong Kong Court.

The Court had previously issued injunctions prohibiting the removal of the aircraft from Hong Kong airport, but these orders have now been withdrawn and the aircraft are therefore available to be flown out by Communist employees of the former airlines. The Communist Government claims that the machines belong to the Chinese people, but the Court has not so far decided their legal ownership. The only positive ruling

CIVIL AVIATION NEWS . . .

it has made is that Gen. Chennault is not the owner. A Chinese Nationalist official in Taipeh commented: "It is now a matter for the United States to take up if it wants to protect U.S. interests in Hong Kong."

Meanwhile, Mr. Dean Atcheson, U.S. Secretary of State, has made vigorous representations to both the British Government and to local authorities in Hong Kong requesting the enforcement of civil air regulations to prevent Communist pilots from transferring the 71 aircraft to their own airfields. When the question of ownership first arose, the Hong Kong authorities cancelled the airliners' registrations; America has suggested that Britain should refuse to re-licence them, as it is hoped to retain the aircraft under Western control. Gen. Chennault has stated that he will fight the local Court's decision "right up to the Privy Council."

SCOTTISH TRUNK ROUTES

THE Scottish Advisory Council on Civil Aviation recently discussed the question of Scottish trunk routes in relation to the recent announcement (see *Flight*, February 16th) of B.E.A.'s aircraft-replacement plans. Sir Patrick Dollan, the chairman, said that a 20-seat version of the Marathon would only be a paying proposition during the holiday months of June, July and August, and thus the adaptation of this type to carry freight, mail and 12-14 passengers on a year-round basis was fully justified. The decision to use Marathons on the Scottish routes did not, however, mean that the Rapide would disappear completely, as it would still be retained for ambulance work; last year, he said, 356 cases were dealt with.

For the trunk routes, on which Viscounts would be used, Sir Patrick thought that economic operation could be secured with an hourly or twice-hourly service, provided that the traffic justified this frequency. He also believed that the Viscount could serve Stornaway, Inverness and, possibly, Aberdeen.

Provisional approval, added Sir Patrick, had been obtained for new booking offices and terminals in Edinburgh and Glasgow and the Council hoped to complete these negotiations at an early date. The number of passengers carried on B.E.A.'s Scottish routes last year numbered 134,234, an increase of approximately 14,000 over 1948. The total of mail carried amounted to 517 tons and freight to 481 tons.

AMERICAN AIRLINES' PROFIT

AMERICAN AIRLINES, INC., announce that 1949 operations showed a profit of £2,325,441, after payment of nearly £700,000 in taxes—a remarkable contrast to their loss of just over £1,000,000 in the previous year. Total revenue was £36,785,714, the highest in the airline's history. Development of freight traffic played a large part in this favourable operating result, the record figure of 33,000,000 ton-miles flown being 42 per cent above that for 1948. The company's fleet now includes 75 Convairs and 50 DC-6s; a further-advanced version of the latter type, the DC-6B, which provides an additional cargo capacity of 4,500 lb. will be delivered early in 1951.

American Overseas Airlines, on the other hand, have reported that last year's operations incurred a loss of £210,000. This amount was reduced by a Federal income-tax credit to a net loss of £124,300. For the previous year the company showed a profit of £354,000. The total revenue in 1949 (£8,363,000) was almost the same as for 1948, but increases in the income from passenger and mail loads were offset by substantial reductions in the revenue from charter operations from and within Germany. Operating expenses were £435,000 higher, chiefly due to the use of larger aircraft. The number

(*Continued at top of column 1, opposite page.*)

British Airways' Operation Statistics for November, 1949

(Figures for the corresponding period in 1948 are given in parentheses)

	B.O.A.C. All Divisions	B.O.A.C. Western Division	B.O.A.C. Eastern Division	B.O.A.C. South American Division	B.E.A. All Divisions	B.E.A. Continental Division	B.E.A. British Division
Total revenue aircraft-miles	2,251,708 (2,781,136)	249,869 (248,450)	1,355,704 (2,062,228)	446,135 (470,349)	1,102,376 (645,569)	798,082 (395,714)	304,294 (249,855)
Total aircraft miles	3,561,022 (3,067,498)	346,270 (310,998)	1,758,226 (2,242,361)	459,526 (514,139)	1,132,592 (663,075)	817,961 (405,431)	314,631 (257,644)
Revenue passengers carried	11,413 (10,956)	2,206 (1,906)	7,741 (7,318)	1,466 (1,732)	37,209 (21,622)	20,560 (7,688)	16,649 (13,934)
Revenue passenger miles	32,982,644 (21,979,659)	5,639,869 (4,253,689)	24,842,359 (23,535,026)	2,500,416 (4,190,944)	11,416,000 (5,992,127)	8,503,775 (3,881,624)	2,912,225 (2,110,503)
Available seat-miles	57,632,345 (53,168,673)	9,453,920 (7,244,738)	40,627,084 (37,810,064)	7,551,341 (8,113,871)	20,367,441 (9,773,950)	14,067,282 (6,371,142)	6,300,159 (3,402,808)
Revenue passenger load factor (per cent)	57.2 (60.1)	59.7 (58.7)	61.1 (62.2)	33.1 (51.7)	56.1 (61.3)	60.5 (60.9)	46.2 (62.0)
Cargo carried (tons): Mail	141.6 (157.9)	31.8 (24.4)	96.9 (113.3)	12.9 (20.2)	301.7 (177.1)	196.9 (90.5)	104.8 (86.6)
Freight	324.5 (342.7)	40.7 (54.6)	240.3 (243.7)	43.5 (44.4)	537.0 (346.5)	401.7 (273.7)	135.3 (72.8)
Total revenue load ton-miles	5,315,606 (5,057,337)	769,313 (639,226)	3,994,024 (3,696,768)	552,269 (721,343)	1,362,537 (772,220)	1,085,337 (579,503)	277,200 (192,717)
Total usable capacity ton-miles	9,910,492 (8,956,894)	1,323,357 (1,074,019)	6,754,424 (6,267,758)	1,832,711 (1,615,117)	2,340,617 (1,232,383)	1,767,783 (916,849)	580,834 (315,534)
Overall revenue load-factor (per cent)	53.9 (58.3)	58.1 (59.5)	59.3 (59.5)	30.6 (31.9)	58.3 (63.0)	61.6 (63.4)	48.3 (61.8)
Total revenue hours	10,995 (15,027)	1,050 (1,136)	7,646 (11,582)	2,299 (2,309)	7,532 (4,748)	4,913 (2,421)	2,619 (2,327)
Total non-revenue hours	1,803 (1,603)	502 (336)	1,194 (1,040)	107 (227)	690 (397)	142 (63)	98 (82)
Equivalent annual utilization (revenue hours) per aircraft	1,426 —	— —	— —	1,504 (1,245)	1,071 (778)	1,317 (777)	794 (780)
Unduplicated route miles in operation at end of period	68,244 (68,647)	7,725 (8,523)	44,534 (55,245)	16,085 (24,879)	12,874 (11,980)	10,299 (9,715)	2,575 (2,265)
Percentage regularity	98.3 (98.6)	93.1 (94.3)	98.6 (99.9)	100.0 (95.6)	94.0 (77.8)	91.8 (55.1)	95.7 (88.5)
Average length of stage flight (miles)	1,076 (993)	1,086 (1,066)	1,100 (981)	996 (1,009)	216 (167)	360 (414)	111 (95)

CORPORATIONS' BIG GAINS

IN November, 1949, the British Airways Corporations and B.E.A.'s associated operators carried over 49,000 passengers. This figure—recently announced—represented an increase of over 50 per cent on the results for the corresponding month of 1948. There were similar increases of 32 per cent and 31 per cent respectively for the mail and freight tonnage carried. Respective figures for mail and freight ton-miles were 885,000 and 1,633,000. Passenger mileage amounted to nearly 44½ million, an increase of 17 per cent on November, 1948. Aircraft-miles flown also showed an increase of some 10,000.

Of these totals, B.O.A.C. carried over 11,000 passengers and flew 33,000,000 passenger-miles; 5½ million passenger-miles were flown on Western Division routes, an increase of nearly 33 per cent. B.E.A. achieved a total of nearly 11½ million passenger-miles which represented a 90 per cent increase on last year's figures. Passenger-mileage on the Continental Division's routes was more than double the figure for the previous November. Companies operating under associate agreements flew some 84,000 passenger-miles, as compared with only 3,000 the year before.

In consequence of the merger of B.S.A.A. with B.O.A.C. on August 1st, 1949, current statistics for the routes formerly operated by B.S.A.A. are shown in the South American division of B.O.A.C. and are included in the figures for all divisions of that Corporation.

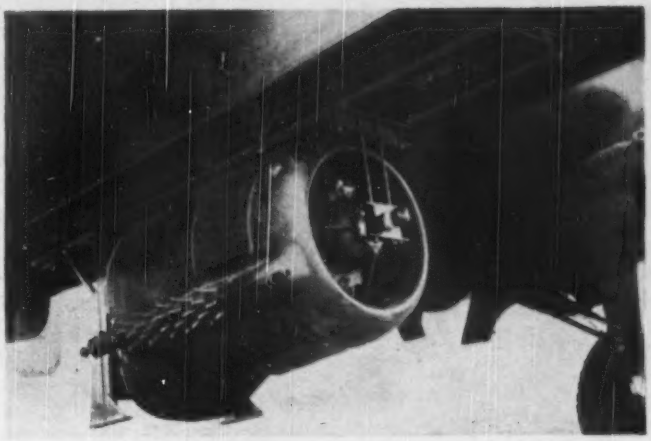
of passengers carried totalled 96,000, and the company made 1,798 transatlantic crossings during the year.

ITALY EXPLAINS

FOLLOWING the Italian charter controversy reported in *Flight* last week, it has been announced that, as the result of an agreement between the British Air Attaché in Rome and the Director-General of Italian Civil Aviation, the difficulties are now likely to be eased, even if they cannot be completely eliminated. Italy has given assurances that she does not intend to ban flights of charter aircraft of other nations, but will accept all requests for flights and "grant clearances on their merits." The Italian authorities claim to be acting within their rights in refusing to clear flights which could be considered as in competition with ordinary scheduled services. They consider that the 70 aircraft weekly which are scheduled for both passenger and freight traffic from Britain to Italy during the summer months should be adequate to meet all demands, and that any additional charter flights would result in the diversion of traffic from the normal services on the London-Milan-Rome route.

It is alleged that the recent refusal to permit the British company to load a cargo of textiles from Milan was due to a failure to complete the necessary formalities within the time specified.

While it is realized that under the terms of the Chicago Convention the Italian authorities have, in their own interest, the right to refuse clearance permits, clearly it is virtually impossible to estimate accurately the traffic demand (both passenger and freight) so far in advance of the actual summer season. The Italian explanations will in no way convince British or other charter operators that they are not being denied the right to participate in the development of international commerce which the "freedoms" of the Chicago Convention were intended to foster.



SUSPENDED ANIMATION: A spare power-plant attached to the bomb-beam of a Halifax for a delivery flight from Britain to Karachi. Airtech, Ltd., of Thame, have closely studied the carriage of freight and equipment in this manner.

BREVITIES

THE Australian Government is reported to have made a dollar allocation for American airfield equipment and approach aids. The delivery date, however, is not yet known.

* * *

On March 1st, American Airlines were compelled, by reason of a ground-staff strike, to cancel over half of their services with four-engined aircraft, nearly all flights with twin-engined aircraft and all cargo services. The number of maintenance workers affected by the strike is 4,600, in 34 American cities.

* * *

The Ministry of Civil Aviation has approved a Commercial Pilot's Licence course given at Air Service Training, Hamble, and students completing the whole of the curriculum at A.S.T. may be granted licences on a basis of 150 hours' flying instead of the normal 200 hours. A.S.T. thus claims to be the first flying-training establishment to offer such an approved course to the would-be commercial pilot.

* * *

In May, B.E.A. will start a daily return service between Birmingham and the Channel Islands, on which 252 passengers can be carried in each direction weekly. The first flight will be made on May 13th, but the daily service will begin a week later. Dakotas will be used and extra flights will be added if the demand warrants it. Monthly return fare from Birmingham to either Jersey or Guernsey will be £11 10s.

* * *

In 1949, T.C.A. carried nearly 1,500,000 pounds more cargo than in the previous year, an increase of 34 per cent. The greatest gain was seen on the North Atlantic routes, where the increase reached 64 per cent. Announcing these figures, the company states that in recent months more westbound Atlantic cargo originating in the United Kingdom has been carried by T.C.A. than by any other airline.

* * *

On Tuesday of last week the Aerodrome Owners' Association held its annual dinner in London. The newly elected chairman, Mr. A. M. Desoutter, proposed the toast of "Civil Aviation," to which Sir Arnold Overton, K.C.B., K.C.M.G., M.C., Permanent Secretary to the Ministry of Civil Aviation, replied. Among other guests present were Air Chief Marshal Sir Frederick Bowhill, G.B.E., K.C.B., C.M.G., D.S.O., and Mr. Edward Bowyer, Director of the S.B.A.C.

The unduplicated route-network operated by Swissair is now three times as large as in 1946. Last year 3,350,669 aircraft-miles were flown and some 153,812 passengers carried. On the whole of last year's operations the company achieved a regularity of 98.9 per cent. The performance is particularly creditable in view of the fact that Swissair operates a fleet of only 20 aircraft.

* * *

The President of Panair do Brazil, Dr. Paulo Sampaio, recently visited the de Havilland factory at Hatfield and flew in a Comet for 1¼ hours. The demonstration included behaviour at the stall and a take-off with one engine cut. Dr. Sampaio is at present considering the question of replacement aircraft for his company and in this connection is interested in the possibilities of jet propulsion.

* * *

As mentioned in a special article in this issue, Air France is pursuing its policy of speeding-up all long-distance schedules by the progressive substitution of Constellations for DC-4s. On March 1st the Far East service to Saigon (French Indo-China) was operated for the first time with a Constellation; elapsed time for the flight was 38 hours. The extension of this line to Brisbane and New Caledonia will, for the moment, continue to be operated with DC-4s.

* * *

South African Airways have withdrawn all Lodestars to reduce the number of flights and decrease petrol consumption. Under a new time-table, which was effective on February 1st, seven Vikings a week now leave Cape Town for Durban, the six additional Lodestar services having been discontinued. Viking flights to Johannesburg and Dakota flights to Windhoek have both been decreased by one a week. Fares between Johannesburg and Rhodesia and between Johannesburg and Salisbury have been increased to offset the higher operating costs.

* * *

B.O.A.C. reopened the direct central Atlantic route between Britain, the Caribbean and the West Indies on March 2nd. A Constellation left London Airport at 12.15 p.m. for Lisbon, to arrive at Bermuda the following morning, and Nassau and Havana the next afternoon and early evening, respectively. The Corporation is operating two services weekly on this route, which provides a connection with the South American west-

CIVIL AVIATION NEWS . . .

coast route to Santiago. The frequency will eventually be increased to three times weekly. Substitution of Stratocruisers for Constellations on the north Atlantic route has now been completed and a daily service is in operation.

* * *

A special diplomatic charter flight recently left London Airport, carrying the delegates of the British Mission to Pakistan. The aircraft was a Hunting Air Travel Viking. On arrival at Karachi, the mission will be taken on a three weeks' internal tour of Pakistan by another of the company's Vikings.

* * *

Air Djibouti, the French company based at Asmara and operating Curtiss Commando aircraft, has appointed Mitchell, Cotts and Co., Ltd., to be its representatives on the Baltic Exchange. Other operators represented by this company are British Nederland Air Services, Ltd., Morton Air Services, Ltd., Central African Airways Corporation and Cyprus Airways.

* * *

Quarterly statistics issued by the Australian department of Civil Aviation show considerable increases in the carriage of freight and mail last year. In September, 1949, the quarterly freight figure had reached 11,733.6 tons as compared with 8,936.7 in June. Mail ton-miles increased from 227,419 in June to 600,352 during the September quarter. The Australian domestic-route network now totals some 52,715 miles.

* * *

The general volume of passenger traffic between the United States and Europe is now 30 per cent above last year's level, according to the New York *Journal of Commerce*. An important factor in this increase is that devaluation is making it possible for American tourists to obtain high value for their dollars. Additionally, many passengers have advanced their holidays to take advantage of the reduced fares which the airlines were offering during the winter season. T.W.A., P.A.A. and Air France report respective increases in January Atlantic traffic of 35, 30 and 32 per cent over the figures for the corresponding month of last year.

* * *

Revised versions of the *A.B.C. Airways Maps* showing the complete route-structure in Europe and throughout the world have now been issued. The routes have been numbered and give direct reference to time-tables in the *A.B.C. Airways and Shipping Guide*. An accompanying key enables the reader to see which company is operating any particular service.

* * *

Qantas Empire Airways have been given permission to carry civilian passengers between Sydney and Tokyo. Operated by Skymasters, the first service left Sydney on March 3rd. It is expected that a bilateral agreement with the Philippines will shortly be concluded, enabling passengers to be carried direct from Sydney to Manila; at the moment bookings are accepted only for through passengers between Sydney and Tokyo.

* * *

A.Cdre. C. S. Cadell, managing director of International Aeradio, Ltd., left London on March 3rd for a tour of Africa, the Middle East and the Far East, to investigate the possibilities of extending I.A.L.'s activities in these areas. He will travel approximately 20,000 miles, and his visits will include Rangoon, Indonesia, Bangkok and Nairobi.

* * *

Statistical returns covering three years' (1947-1949) activities by Air Atlas, the French airline operating domestic services within Morocco, show that the company has been enjoying a reasonable share in the world-wide expansion of civil aviation. With a fleet of six DC-3s, the aircraft kilometres flown in 1947 were 1,581,625; in 1948, 1,612,885; and in 1949, 1,984,905. The volume of freight carried increased proportionately.

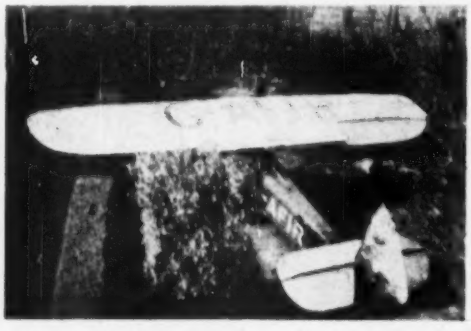
FROM the CLUBS

THE Darlington Aero Club completed a total of 150 hours during the three months from November to January. Social activities have expanded considerably and now include dances, film shows, whist-drives, clay-pigeon shooting, and shooting matches with a nearby R.A.F. station. Recently the M.C.A. announced its approval for the 30-hour Private Pilots' Licence course, so future members will have the added benefit of this facility. The annual air display has been arranged for Saturday, June 10th.

* * *

FLYING at the Gloucester and Cheltenham joint airport will cease for three days in the summer of 1951 when the Three Counties Agricultural Show takes place on the airfield. A condition of the arrangement is that the show authorities will pay £300 for the loss of flying facilities, together with the cost of subsequent ground-clearance and of the necessary advertising regarding flying-prohibition.

The Ministry of Civil Aviation had previously given permission for flying to take place concurrently with the show, provided that adequate safety measures were ensured by separation of the show site and the aircraft operating area. The Three Counties Society, on the other hand, felt that the Ministry's plan left little or no room for car parks, and it was finally agreed that flying should be discontinued and compensation paid.



HOME-GROWN: The aircraft seen here has not, as might at first appear, been neatly deposited amidst the foliage as the result of engine failure. It is a re-conditioned Luton Minor, the property of Mr. A. W. Ord-Hume, who carried out the work in his garden. As mentioned in *Flight* of February 2nd, he recently completed the overhaul of an Aeronca 100. The Luton Minor is expected to fly in June.

* * *

DENHAM Flying Club officially began operations on March 1st. (It will be recalled that the Denham Aero Club, with which the new club has no connection, was forced to close down last year.) Two Taylorcraft and three Magisters are now available, and it is hoped that a Miles Mercury will be ready for more advanced training in about six weeks' time.

Although the official opening date was, as stated above, March 1st, the club has been doing a certain amount of flying during the past two months and has achieved the creditable monthly average of 50 hours with only one aircraft in use most of the time. Membership now amounts to some 250, of which total 40 members form an active flying nucleus. In the coming months it is hoped to organize Sunday-morning formation flights as a regular feature. The C.F.I. and club secretary is Mr. J. Briggs, who is assisted by three other instructors.

* * *

THE Leicestershire Aero Club, which is leaving Ratcliffe airfield at the end of this month, is holding its final farewell party next Saturday. So that members may benefit by a little extra flying, the closing date has been extended to cover the last two week-ends of the month. A new committee has been formed to speed up the transfer to another airfield, although it has not yet been decided whether this will eventually be Rearsby or another nearby site which provides suitable facilities. All possible measures are being taken to expedite the move and thus reduce the period during which the club's activities will be curtailed. The committee announces that there will be a rebate on subscriptions for the period during which no flying is possible.

* * *

IT would appear that a somewhat unusual situation may soon arise at Staverton airfield, where, in addition to the existing Cheltenham Aero Club, a resurrection of the pre-war Cotswold Aero Club seems likely. The airfield is shortly to be de-requisitioned and it is intimated that the pre-war club will attempt to re-establish its former status. Whether there will be sufficient local interest to justify the existence of two clubs seems debatable, but as the aims of the Cheltenham Aero Club (with its more advanced standards of flying) would seem to differ to a large extent from the possibly less specialized activities of the returning Cotswold club, it is possible that they may be able to operate side by side, if not hand in hand. Further details of the position at Staverton will be given when the plans for the new club have been formulated.

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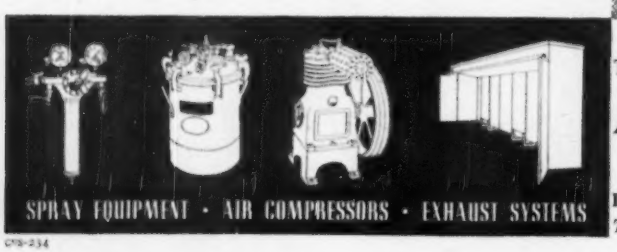

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THE MENACE of GADGETRY

Complication versus Ease of Maintenance : A Designer's Pertinent Criticisms

SOME forthright views on the ever-increasing complexity of modern aircraft were expressed by Mr. R. E. Bishop, C.B.E., F.R.Ae.S., in his R.Ae.S. lecture last Thursday under the title "Design for Maintenance." Mr. Bishop, who is chief designer and a director of the de Havilland Aircraft Co., Ltd., was particularly critical of electrical complication, as the following précis of his lecture will show.

Pointing out that between 25 and 40 per cent of airline direct-operating costs arise from maintenance, the lecturer began by emphasizing that the problem was largely due to the increasing complexity of modern aircraft. A proper outlook on maintenance, he said, should begin in the constructor's drawing office; draughtsmen might well be given practical experience of assembly of the components they designed and could also profitably pay visits to operators' maintenance shops. There was a certain amount of feeling among maintenance engineers that they were not consulted during the design stage; as far as his own firm was concerned, said Mr. Bishop, it had for a long time been its policy to consult its own servicing department and operators' engineers throughout the design stages.

Nevertheless, it was no good having an aircraft that was perfect from the maintenance point of view if it would carry no payload as a result. Criticism during the early stage of a design was valuable—though there were few people competent to give it; but criticism was of little use to the designer after the aircraft had flown. During the design of the Comet a senior maintenance engineer of B.O.A.C. had been stationed at Hatfield and was always available to give the drawing office advice on maintenance features.

Civil and Military

Comparing the widely contrasted maintenance requirements of civil transport aircraft and military types, the speaker said that, in the former, the aim was to keep the aircraft flying every day, thus putting a premium on the ability to change components quickly; the latter, on the other hand, spent long periods on the ground, even in war-time. As against this, military servicing often had to be done under appalling conditions and by less skilled personnel. It would therefore seem logical to cut to the minimum the amount of maintenance to be done by squadrons; he thought it should be possible, with the modern jet fighter, to make the airframe function satisfactorily for, say, 100 hours without any attention other than routine re-fuelling and greasing. There was nothing much that could be done to the gas turbine: it either went on working or was completely changed, so that the determining factor was likely to lie in the equipment and systems. In this sphere, it should be possible to make each item capable of functioning for 100 hours or six months, whichever was the less. Radio and radar sets gave far too much trouble and this, thought Mr. Bishop, was largely due to such things as solenoid connections and terminals with no method of locking—in fact, a very low standard of detail design which would not be tolerated in the structure itself. He would suggest that at the end of this 100-hour flying period the machine be sent to a properly equipped and manned workshop for major overhaul; more time could be spent in dismantling the structure to get at components than could be tolerated in the case of a civil transport.

In future types of fast military aircraft, thin wings and slim fuselages might make removal of components difficult: equipment should therefore be capable of functioning satisfactorily between major overhauls, to achieve which object a higher standard of reliability was essential, particularly in the case of electrical systems.

More emphasis would probably have to be placed on intensive flying of early production aircraft under circumstances approximating as closely as possible to actual service conditions, for an aircraft could be flown round an airfield for months without showing up those troubles which would quickly develop as soon as it went into operation. Though recognizing the danger of producing an inflexible type, the lecturer still thought it should be possible to produce a fighter in which the main structure, including undercarriage and power-plant and hydraulic and basic electrical systems, would function without attention for 100 hours.

Turning to transport aircraft, Mr. Bishop said that there was the danger that the designer, in his natural desire to improve efficiency, would press the engine builder too far in such things as improved fuel consumption, with a resultant increase in engine complexity; the most efficient engine was useless unless it was reliable.

Low-wing layouts were best from the servicing standpoint, because components could be reached without steps while, internally, control and electric cables, hydraulic pipes and so forth, could be installed accessibly under the cabin floor. Pressure re-fuelling, though adding complications, had the advantage of making it unnecessary for people to climb on the wings to refuel the aircraft. Every effort should be made to avoid "handing" major components.

The position of transport joints in the main structure could be of considerable importance: the speaker's own choice was for a wing joint at the side of the fuselage, which allowed wings and fuselage to be transported more easily than in the case of the conventional stub-wing permanently attached to the fuselage. Also, damage in a bad landing was usually confined to the area round the main undercarriage which, when it was attached to a stub-wing, might involve a big job of dismantling.

On the question of accessibility, Mr. Bishop said that, ideally, it should be possible to remove any item without the disturbance of structure or pipes; the minimum number of attachment bolts should be used; and sub-assemblies should, if possible, be bench-tested before installation. It was desirable to separate routine maintenance and charging points so that a number of men could work at the same time. In the case of large pressure-cabin aircraft, where it might be difficult to provide a number of access doors, it would be better to allocate part of the under-floor area to an equipment compartment, where services could be reached without the necessity of removing the linings of baggage compartments; again, however, such an arrangement was attractive only if a number of men could work at the same time. For the same reason, items of equipment needing frequent servicing should not be placed in the cockpit if this could be avoided. Hinged instrument panels were a good feature.

Startling Statistics

On the subject of unnecessary complexity, the lecturer said that users were far too inclined to ask for every conceivable piece of complicated equipment without having given consideration to its effect on maintenance. The chief engineer of T.W.A. had stated that, in the total airframe maintenance cost of a modern, four-engined aircraft, 95 per cent was due to equipment, systems and automatic gadgets, while a large proportion of this percentage was accounted for by electrics and electronics. One of the latest transports to go into service, said Mr. Bishop, had nearly 900 electric units, such as actuators, relays, motors, and so on, in addition to ten combustion heaters. This sort of thing put the maintenance engineer in an impossible situation.

Power actuation should only be resorted to where loads were too great for manual operation—designers took the easy way out because it was much more difficult to design good cable or mechanical-linkage runs than to put in a few electric wires. Good cable controls required no indicators to show that they were still functioning, needed little maintenance and were thoroughly reliable. In undercarriage systems, much trouble had been experienced with lights, due to the unreliability of micro-switches, which were apt to fail when required to work under bad conditions. The Comet had mechanical indicators, operated by cables from the radius-rod locks, for the main undercarriage and nose-wheel.

The foregoing arguments, continued Mr. Bishop, applied with even greater force to electronics, which were far too attractive on paper. There seemed to be nothing that could not be done by a little black box with a few valves in it. Unfortunately, this one small box had a habit of becoming several much larger and heavier boxes. The real trouble, however, started when the aircraft got into service. Here the lecturer cited recent difficulties with automatic pilots: one was told, he said, that in one particular type—not of British design—valve failure in certain circumstances made it possible for the autopilot to put on full rudder, aileron and elevator, all at the same time!

Some of the responsibility for the unreliability of electrical equipment must be shared by the aircraft designer, who had

(Concluded on p. 340.)

PROSPECTING the COMET ROUTE

Sir Miles Thomas, Chairman of B.O.A.C., on High-lights of a 30,000-mile Air Tour

In New Zealand: Right, the Prime Minister, the Rt. Hon. S. Holland; centre, Sir Miles Thomas: left, the Hon. W. Goosman, Civil Air Minister.

ON his return, on February 27th, from his 30,000-mile "Comet trail-blazing tour," Sir Miles Thomas was invited by *Flight* to give his outstanding impressions of the journey. In answer to questions, he made the noteworthy statements quoted below. The flight was by scheduled services, with the exception of 900 miles in a R.N.Z.A.F. Devon. He flew to Australia in Constellation 749s, in Australia by T.A.A. and A.N.A. DC-4s and DC-3s; across the Tasman Sea in T.E.A.L. Solents; and on the return journey, from Singapore, by B.O.A.C. Argonauts. At Hong Kong, in the Deep Bay location, Sir Miles inspected the site for a new airport; in a public statement issued on his return he said that it should provide ample runway length for the Comet—2,500 yards with excellent approaches. In the same announcement he said: "It is hoped ultimately to reduce the elapsed time between London and Sydney to something under 40 hours when the Comet settles down to the route, but easier scheduling will be arranged to enable air- and ground-staffs to gain experience."

"THE object of my journey was threefold: First to get up-to-date information on the Corporation's current activities on the Kangaroo and Far Eastern routes; secondly, to inspect and discuss airport facilities for the Comet; and thirdly, to have business talks with executives of the Commonwealth airlines with whom B.O.A.C. has close associations.

"I am glad to be able to say that the recent revision of the administrative pattern of B.O.A.C. is beginning to show tangible and most encouraging results. At the out-stations all along the Kangaroo routes the managers reported (and, indeed, demonstrated) that the flow of work is proceeding more smoothly and although, inevitably, staff morale had been affected by the enforced redundancies, there was a rising tempo of enthusiasm and a sense of effective accomplishment.

"On all occasions except one I travelled as a normal passenger on scheduled services. The quality of food aloft has attained a very high standard now that frozen food, pre-cooked, is provided by B.O.A.C. The temporary elimination of "George," the automatic pilot, is making greater demands on the crews, but these are not excessive and, indeed, manual control of aircraft flying through the turbulent conditions beween Indonesia and Darwin is preferred by some of the more experienced passengers. I found them very appreciative of the amenities that are provided at Karachi and Darwin for a quick shower, shave and change of clothes, which have a remarkably freshening effect.

"Airport control in Sydney (Mascot) could, I thought, be better. The airport was pronounced "closed" almost on final approach, the decision being taken out of the captain's hands, and a lengthy diversion to Dubbo imposed.

"All along the route I was much impressed by the close co-operation between Qantas and B.O.A.C. personnel. Equally, a tour of Qantas maintenance facilities at Mascot left no doubt that the high standard set by the original Australian pioneers is being thoroughly well maintained by Mr. Hudson Fysh and his executive.

"On the return journey from Singapore north to Hong Kong and then west I travelled by Argonaut. These new aircraft of B.O.A.C. are gaining new friends every day. The pilots like the way that they handle, and the passenger amenities, with the central galley and the lounge space aft, plus the convenience of individual tables provided for feeding, are much appreciated. The latest modifications to the headrests make the chairs as comfortable as any I have travelled in, and neither at climb nor cruise power are the Merlins, with their fish-tail exhausts, in any sense fatigue-inducing as to noise level. When the cross-over manifold systems are installed, which eject all the exhaust outboard, the Argonaut will be very quiet indeed.

"As to the preparations for operation of the Comet on the Kangaroo route, I found tremendous interest everywhere in the potentialities of this all-British jet-driven civil aircraft. Because of the effect of temperature and humidity on the take-off power of jet engines generally, the airport conditions have to be examined carefully and in this examination I benefited from the investigations that Sir Frank Whittle had conducted before my arrival.

"At Calcutta, which was once thought to be a critical point, I was assured by the Indian Director of Civil Aviation, Mr. Bhalla, that he was wholly sympathetic to the demands of the Comet, and he gave me an assurance that a 7,000ft runway with a 500ft overshoot space would be available when required. In Singapore it seems clear that the joint use of Tengah aerodrome by the R.A.F. and civil aircraft is undesirable, and an inspection of Kallang indicated that there was adequate length of ground available, that the bearing strengths were suitable, and that the approaches were satisfactory. Incidentally, because Kallang is so much nearer Singapore's centre than is Tengah, an estimated saving of £30,000 a year in passenger transport costs can be envisaged.

"The Comet not only needs satisfactory runways but radio aids as well. These are being installed on the route. Instrument landing systems and long-range voice facilities will be available. The policy behind the operation is that the Comet shall be taken under control while at altitude and several hundred miles away from the airport, so that the pilot can be allotted a time of arrival and given an accurate forecast of local weather conditions. While it is clear that B.O.A.C. will shoulder the cost of pioneering Comet operation on these routes, the local authorities realize

that other airlines, including their own state-controlled organizations, will be using jet-driven aircraft in the none-too-distant future, so that it is in their own interests to see that the necessary facilities are provided.

"Between Australia and New Zealand I travelled on the new Solents that are being operated by T.E.A.L. These aircraft are running to 100 per cent load factor and are proving extremely popular with passengers. They are running with highly commendable regularity, and seem particularly suited to the Tasman weather conditions. I gained the impression that New Zealand was a natural flying-boat area, as the landplane facilities are in the main a considerable distance from the city centres and extension of runway length is a very expensive undertaking.

"I formed the impression that there was a considerable market developing, not only in Australia but in the Far East as well, for medium-sized British aircraft. What seems to be wanted is something to replace the DC-3s as they become obsolete, for the shortage of spares makes their operation difficult. A 20-25-seater aircraft with flexible passenger/freight capacity seems to be indicated. In Burma there is to-day a full-scale airlift in operation. This is due to the fact that road transport runs into difficulties caused by predatory bands of robbers who operate quite close to town centres—within thirty miles or so—and the railway bridges have all been blown, so that train transport is practically non-existent. Even potatoes are being air-freighted in Burma, and the decision to make a 3,000yd runway at Rangoon, already a very busy airport indeed, is in itself an indication of the high favour in which air transport is regarded in that part of the world.

"Indeed, the impression I obtained during the whole of my tour was that civil aviation is on the up-grade. Peoples of the East have taken to flying as a common amenity in their lives. And in Australia, one out of every seven members of the populace travel by air every year. It is claimed locally that this is the highest utilization figure anywhere.

"Finally, let me tell you how I heard the Election results. We were coming into Calcutta on the Friday evening, which would be mid-day in London. I was standing up in the Argonaut cockpit wearing earphones, so that I could watch the approach while listening to the control tower.

"By some means the radio officer picked up a London broadcast and superimposed it in my phones only (not the crew's). The result was that I heard something like this: 'Speedbird George How Able approaching Calcutta.' A snatch of music, then, 'Are you flying Victor Fox?' The B.B.C. breaks in with 'Here is the latest state of the parties—Labour 193, Conservatives and others 155.' 'This is Dum Dum Control receiving you loud and clear.' 'Mr. Zilliacus has lost his seat.' 'You are now clear to land.' More music. 'The Liberal candidate has lost his deposit.' More music. Then the voice of an Indian pilot, excitedly disgruntled because he has been told to stand off until we have landed; and so on.

"It would have been even more exciting if we'd been a little later and heard the almost photo-finish result. But you can't have everything."

THE MENACE OF GADGETRY (Continued from page 327)

pushed the electrical engineer to produce smaller and lighter equipment without sufficient regard for reliability.

On the subject of electronic complication, Mr. Bishop cited the cabin blower of the Comet. Here, he said, it was decided to avoid using "an electronic box of tricks"; instead, they tapped the main engine blower. There was, at that time, and probably still was, a regulation which prohibited tapping the blower for cabin pressure, but they thought it was not necessarily a correct one; and, as there seemed to be good reasons why such a scheme might work, it was tried out on the test-bed and in a Ghost-Vampire; the whole system had been working well in the Comet to date, with a great gain in simplicity. This illustrated the folly of attempting to make regulations before enough experience had been gained to know whether they were either necessary or feasible.

Another source of complication was the tendency to guard against every conceivable type of failure, likely or unlikely. Also, there was the danger caused by failure of the gadgets which this policy encouraged. He quoted the case of a pilot having to make an emergency overloaded landing when a fire-warning light flashed—only to find that the warning was due to an electrical fault in the indicating circuit.

After discussing in some detail the desirability of simulating rigorous service-conditions in the testing of components and systems before their incorporation in the aircraft, the lecturer went on to compare piston engines and jets from the maintenance standpoint. He instanced one aircraft in which plug-changing was a major operation involving the removal and substitution of 224 plugs and necessitating considerable removal of cowlings and cylinder baffles. He proceeded to give an impressive list of items, ranging from airscrew controls to combustion heaters, with which the gas-turbine user was not concerned. Such simplification, in turn, brought a complementary easing of the situation in regard to control systems and cockpit simplification. The smoothness of the gas turbine, also, greatly reduced the necessity for routine maintenance throughout the aircraft.

Though the turboprop, basically, was little more complicated than the pure jet, there was some danger of losing this simplicity in the case of the larger coupled types at present being developed; Mr. Bishop thought that, while they might be justified for long-range military aircraft, they might well turn out to be more difficult to maintain than some of the piston engines at present in use.

THE DISCUSSION

Opening the discussion, Mr. G. R. Edwards (Vickers chief designer) said that Mr. Bishop's paper was "full of common sense and wisdom." He agreed the trend towards automaticity was one of the main causes of the complexity of civil aircraft: the highly trained pilots of to-day probably spent so much time worrying whether the automaticity was working that they would be far happier without it. He thought, however, that electric actuators were preferable, particularly for pressurized aircraft. Quoting the example of electronic controls for turboprop power-plants, Mr. Edwards considered that the Americans were showing signs of becoming "electronic-mad."

Replying, Mr. Bishop reiterated there was great need for improvement in the field of electrics; during the Comet test-flying, more trouble had been caused by a V.H.F. set than by any other component in the aircraft.

Mr. Sydney Camm (Hawker chief designer) emphasized the need for extensive pre-delivery testing and, unlike Mr. Edwards, considered that the electrics situation was getting worse.

Mr. N. E. Rowe (B.E.A. research and long-term development) agreed that it was important in test programmes to simulate actual operating conditions as far as possible. On tests with the Ambassador, attempts were being made to feed into the test-rigs such factors as vibration, dust, temperature-changes and humidity. Pre-determination of the lives of particular components was most desirable.

Replying to a question on the possible effects of high-frequency vibration on fighter aircraft, Mr. Bishop thought a recent firing demonstration of a 30 mm gun was "a horrible sight."

Mr. D. Mowrer of the Boeing Aircraft Corporation, gave a brief outline of his company's approach to the problem of co-ordinating the viewpoints of design and maintenance engineers. He recommended that civil aircraft should be designed as far as possible to facilitate "trouble shooting" without removal of the component.

FORTHCOMING EVENTS

March 9 R.Ae.S. (Isle of Wight): "High-speed Research," by J. D. Derry.

March 10. R.Ae.S. (Portsmouth): "Design Problems of Large Flying Boats," by H. Knowler, F.R.Ae.S., A.M.I.C.E.

March 13. R.Ae.C.: Film Show, Londonderry House.

March 14 Aero Golfing Society: March v. R.A.F.G.S., followed by Flight Dinner.

March 14. R.Ae.S. (Belfast): "Problems of High-speed Flight," by H. Davies, M.Sc., F.R.Ae.S.

March 15. R.Ae.S. (Coventry): "Flying Boats," by H. Knowler, F.R.Ae.S., A.M.I.C.E.

March 16. R.Ae.S.: "Air Survey," by Prof. C. A. Hart, M.Sc.(Eng.), Ph.D., M.Inst.C.E., F.R.I.C.S.

March 17. Institute of Transport: Annual Dinner.

March 21 R.Ae.S. Section Lecture: "Boundary Layer at High Speeds," by A. D. Young, M.A., F.R.Ae.S.

March 22. R.Ae.S. (Manchester): "Accident Investigation," by A. Cdre. Vernon Brown, C.B., O.B.E., M.A., F.R.Ae.S.

March 23. R.Ae.S. (Glasgow): "Fuel Consumption," by J. Leggett.

March 23. R.Ae.S. (Isle of Wight): "Gliding," by P. A. Wills, C.B.E.

March 24. College of Aeronautics Senior Common Room Society Annual Dinner.

March 25. Helicopter Association: "Performance Testing of Helicopters," by F. O'Hara, M.A.

March 27 R.Ae.S. (Bristol): "Gliding" by A. H. Yates, B.Sc., A.F.R.Ae.S.

March 28. Institute of Transport (Metropolitan Graduates): "Post-war R.A.F. Developments and their Effects on Civil Aviation," by A. J. Allum.

March 28. R.Ae.S. Graduates: "Undercarriage Design and Testing," by G. S. Cranwell, Grad. R.Ae.S.

Mar. 28-31. Royal Meteorological Society: Symposium Oxford.

March 29. R.Ae.S. (Gloucester and Cheltenham): "Aircraft Materials and Processing," by Dr. W. Sutton, D.Sc., F.R.Ae.S., F.I.M. (at Gloucester).

March 30. R.Ae.S.: "Testing Aero Engines and Power Plants," by A. C. Lovesey, O.B.E., B.Sc., F.R.Ae.S.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Power Pods

I WAS surprised to note that your contributor Stanley H. Evans, in his "match" with Mr. Wellwood Beall concerning the pros and cons of power pods ("American Notebook," *Flight*, February 23rd), failed to raise what appears to be one of the most important issues.

May I ask what are the asymmetric power qualities of such a design? To fulfil the arguments quoted by Mr. Beall the criterion would seem to be to have the units slung on stalks from the extremities of the wings. Surely such an arrangement would be fatal should any type of power failure—not necessarily an engine blow-up—occur during take-off. Since the interval between becoming airborne and attaining the critical speed is possibly one of the most dangerous, I should have thought it would have been most carefully studied. It would be interesting to know the estimated critical speed of the projected civil B-47 design. The apparent omission of the Jato units is another step in the wrong direction.

Thank goodness the designer of the Comet has taken advantage of the gas turbine's flexibility of installation, thereby showing some regard for real as opposed to erroneous safety measures.

A. A. JARVIS.

Surbiton, Surrey.

Giants of the Past

WITH regard to Mr. Edney's letter (February 23rd) on the subject of the Tarrant triplane, there is one historical point which is worth noting.

The accident in which this machine was involved was subsequently used in legal argument to decide when an aircraft is deemed to fly. If memory serves me correctly the Tarrant nosed right over when the top engines were opened up and it was subsequently suggested that, as the aircraft had not left the ground, it was not in flight. After much legal argument and, I believe, the assistance of a technical surveyor, it was eventually held that when an aircraft was in position to take off and throttles were opened with the intention of taking off, it was from that moment legally "in flight" regardless of whether it had left the ground or not.

A. G. LAMPLUGH.

London, W.1.

MR. GEOFFREY DORMAN'S interesting article, "Size is Relative" (*Flight*, February 9th), recalls a little-known and relatively sizeable aircraft of 1915 vintage. I refer to the Curtiss twin Canada, which was probably the first "foreign" aircraft to have been fitted with the new-fangled "Rafwires." These were fitted during the winter of 1915 by the R.F.C. Pinehurst riggers in the Farnborough balloon shed. The aircraft crashed farther down the Plain one Saturday morning in (if my memory is correct) January, 1916.

There was also a big Sikorsky erected at Northolt about this time. The model was a flop. The remains of this giant were at Northolt up to 1922.

EDWARD HOCTOR.

Dublin, Eire.

Thunderstorm-flying

ALTHOUGH your correspondents, Charles Gardner and R. C. O. Lovelock, speak from war-time experience and refer chiefly to flying boats and operational aircraft, I suppose they, like a lot of other people, are really wondering about one aircraft only for the time being, namely, the Comet.

There is not much doubt that they are right in saying that the Comet, and in fact all passenger-carrying airliners, must avoid cu-nim in the tropics. Nearer home, and particularly over France (which country, at certain times of the year, can offer some of the worst thunderstorms to be found in our part of the world) it is probably not so much the risk of structural failure or loss of control that must be worried about as the degree of discomfort which passengers would be willing to stand.

To revert for a moment to war-time experience again, quite a number of Bomber Command pilots would be prepared to tell some good tales of the discomfort that can be caused by trying to fly under thunderstorms in France, particularly if one were to mention the name Givors. The interest in this particular operational attack by Lancasters, made on a summer night in 1944, is that although some of the crews were very inexperienced and the intensity and duration (at least four hours) of the continuous line of thunderstorms was quite unexpected, only one of nearly two hundred aircraft was, so far as I remember, a probable storm casualty. In other words, there was bags of discomfort, ice and static, but not very much real danger. Admittedly the Lancs were sneaking along at only 185kt and between 1,500 and 3,500ft, but it was so rough that most people found that "George" couldn't cope.

I don't altogether agree with Charles Gardner when he says that in daytime cu-nims can be seen and avoided, but at night without radar one could be in them with any warning at all. The Comet is not expected to climb or descend vertically, and although it may operate well above weather for most of a journey, it will also have on occasions to fly through cloud for many minutes on the way up and on the way down. As cu-nims are not always conveniently isolated from other cloud, there is a risk by day or night of flying into cu-nim mixed up with other stuff. Another point on which I'd take him up is that if one is above all normal layer cloud at, say, 25,000ft it is almost as easy to see tops, cu-nim or any other sort, by night as by day—probably just as easy if there is a moon.

If we accept that the Comet and other such aircraft can operate for most of the time above weather, we can say that virtually all the danger from cu-nim is in the area of the take-off and landing airports. Therefore, would it not be better to concentrate on reliable local met. gen and one bigger and better cu-nim warning radar, on the ground at each airport to supply all aircraft with the necessary information for safe approach or departure in duff weather? There are already too many "miniaturized" bits and bobs to go wrong in an airliner.

D. DAVIES.

Cardiff.

R.A.F. Flying Training

WE feel that an editorial in the February 23rd issue of *Flight*, under the heading "The R.A.F.'s New Trainer," gives an erroneous impression (particularly to overseas students of Air Force training) of the syllabus of training provided by Training Command of the Royal Air Force.

All pupil pilots in the Royal Air Force receive their initial or basic training on the Percival Prentice, long since the standard basic trainer of the R.A.F. and other Air Forces overseas.

With the introduction of the advanced trainer, the Balliol, the planned sequence of pilot training will be implemented in aircraft employing the side-by-side seating arrangement, which is considered by the Air Ministry as sounder and more economical in training the modern Service pilot than the tandem seating arrangement previously employed.

D. M. BAY,
Percival Aircraft, Ltd.

Luton, Beds.

[Our remarks were primarily concerned with new trainers, and we assumed that it is by now widely known that the Prentice is, as our correspondent points out, the standard basic trainer of the R.A.F. and of other Air Forces abroad. —ED.]

Wanted—a Sailplane

AS secretary of the Kangaroo Gliding and Soaring Club I have been requested to write to you in hope that you might, through your columns, be able to help us. From the name you will have realized that we are a club situated in that part of the world known as Australia. Living in rather a large place without very many people, we have found that gliding is perhaps not as highly organized as we imagine it to be in England. We have been unsuccessful in our attempts to obtain a primary, intermediate or sailplane.

As there is apparently none available, we intend to build one, but lack plans for construction. This is where we thought perhaps you might help. We want to build a two-seater sailplane, and would like to obtain as many plans of various types as possible, so that our field of choice will be wide.

Perhaps there are gliders for sale in England either new or second-hand. Any aid your readers might give will be sincerely appreciated. The address of the Kangaroo Gliding and Soaring Club is c/o Navigation Section, Qantas Empire Airways, Ltd., Kingsford Smith Aerodrome, Sydney.

K. D. SMITH,
Sydney, Australia.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

SWEETBRIAR: The most rigorous Arctic manœuvres, under the foregoing code-name, have recently been concluded by Canadian and U.S. Forces. F/O. M. G. Saunders, of No. 410 Squadron R.C.A.F., is seen leaving his D.H. Vampire after a job well done.

R.A.F. Small Arms Meeting

A CAMP to accommodate 2,000 R.A.F. and W.R.A.F. personnel is to be erected at Brookwood, Surrey, for the annual meeting of the R.A.F. Small Arms Association, to be held at Bisley from June 10th to 16th. About 1,500 competitors will take part in the meeting and approximately 40 officers and 600 other ranks will be required for administrative and range duties. After the Small Arms Association meeting, about 100 officers and airmen will remain at the camp to train for the R.A.F. teams which will compete in the Imperial meeting in July.

Nos. 1 and 5 Group Memorials

IN a letter published in *Flight* of February 2nd, the A.O.C.-in-C., Bomber Command, Air Marshal Sir Aubrey Ellwood, announced the publication of booklets commemorating the dedication ceremony in Lincoln Cathedral on November 8th last. On that occasion, the Memorial Books of Nos. 1 and 5 Groups, Bomber Command, containing the names of 21,000 aircrew lost during the war, were entrusted to the care of the Dean and Chapter of Lincoln.

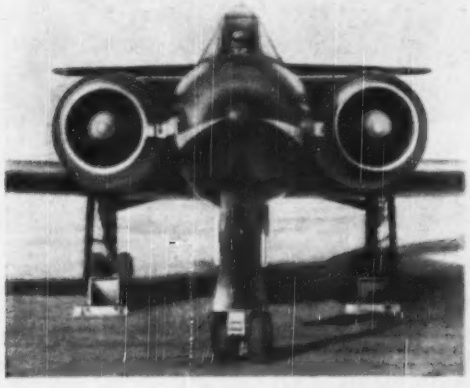
The booklets are now available, and may be obtained from Headquarters, Bomber Command, R.A.F., High Wycombe, Bucks, price 3s 6d each. Those who can give more than this sum are asked to do so; the additional money will be used for the maintenance and furnishing of the Air Force Chapel of the Cathedral. There are two booklets —one for each Group—and those ordering should state which they require.

Air Survey in 1950

FOR this year the R.A.F. Central Photographic Establishment, Benson, Oxford, has a comprehensive programme of aerial photography for the Ordnance Survey, Ministry of Town and Country Planning, Department of Health for Scotland and other Government departments. For the Ordnance Survey alone, the area in England and Scotland to be covered is about 5,000 square miles.

The aircraft used will be Mosquitos, Spitfires and Ansons. In order to survey the Scottish areas economically a small detachment of aircraft will be established at R.A.F. Station Leuchars, Fifeshire, during March to take advantage of the spring and early summer months, which offer the best photographic weather.

Among the towns to be photographed for the purpose of making new 50in-to-the-mile ordnance maps are Aberdeen, Cheltenham, Gillingham (Kent), Gloucester, Gravesend, Leicester, Nottingham and Poole. Many rural areas will also be surveyed, and certain special work will be undertaken as required, such as the survey of railway sidings and traffic congestion areas. One recent task of this type was the air photography of the Severn Valley flood areas.



DOUBLE-BARRELLED, NO CHOKE: This sporting-gun analogy seems apposite for this new aspect of the Avro Canada CF-100 heavy fighter. The Rolls-Royce Avons are mounted snugly on the fuselage sides, and with no impediment to aspiration.

Photography at Padgate

ONE of the R.A.F.'s smallest but busiest units is the No. 1 Reception Unit Photographic Section. Consisting of a corporal and two airmen, it has the job of photographing all the National Service airmen who come into the R.A.F. The unit is housed at R.A.F. Station, Padgate, near Warrington, through which all National Service airmen enter the Royal Air Force. Each week the section photographs some 1,350 airmen and airwomen. Two prints are required for each new arrival to complete their passes. The three members of the unit also carry out the processing of the 2,700 prints each week.

New Director of Armament

AIR COMMODORE F. G. S. MITCHELL, until recently Vice-President (Air) of the Ordnance Board, has been appointed Director of Armament at the Air Ministry. Before going to the Ordnance Board in May, 1948, A. Cdre. Mitchell was in Washington for over two years, joining the British Air Commission there (now the British Joint Services Mission) in February, 1946. In the early years of the war he was at the Chemical Experimental Establishment, Porton, and from October, 1942, until he left for Washington he was Assistant Director of Armament Research and Development at

SERVICE AVIATION . . .

the Ministry of Aircraft Production.

A. Cdre. Mitchell, who is 48, was among the first entry of cadets at Cranwell, in 1920, and was commissioned at the end of 1921, gaining his armament specialist qualifications six years later after a long course at the Armament and Gunnery School, Eastchurch.

It is also announced that G/C. R. H. Stanbridge, Principal Medical Officer of R.A.F. Transport Command since April, 1949, has been appointed Principal Medical Officer of Bomber Command, with the acting rank of air commodore.

R.O.C. Looks Back

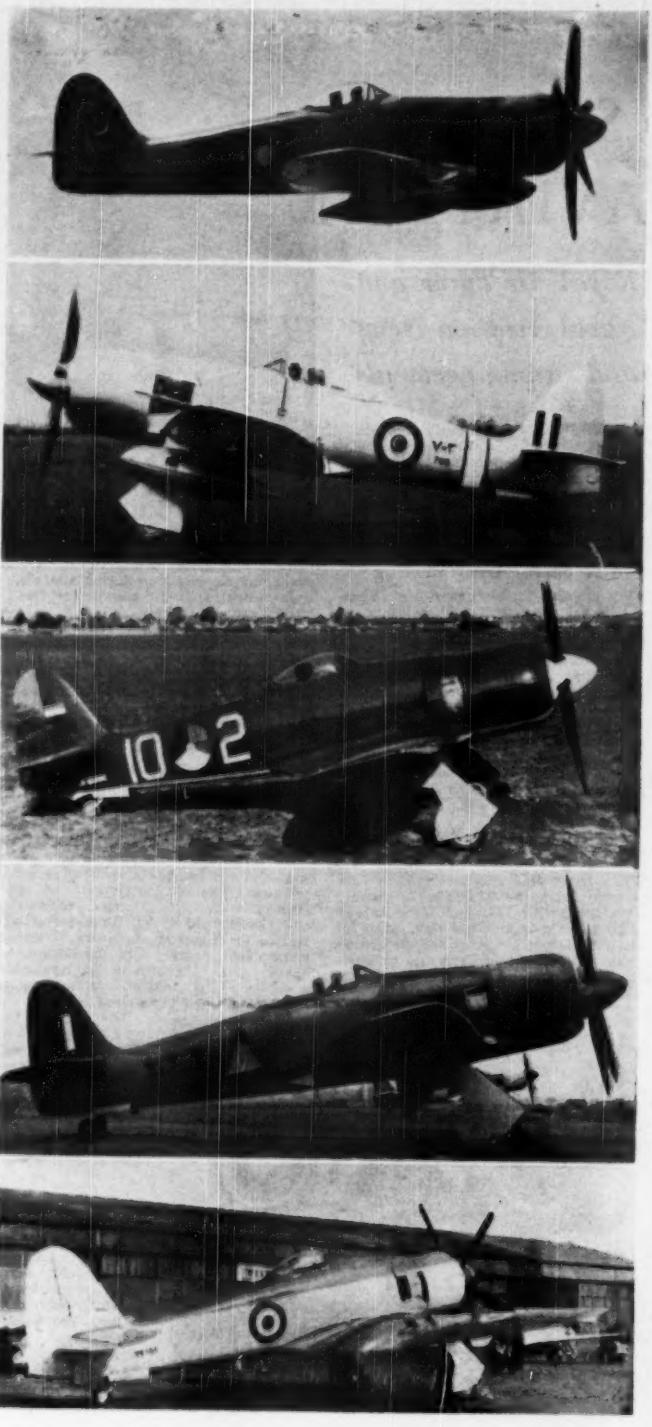
THE Southern Area of the Royal Observer Corps—which includes the zone where the first observer post was set up at Cranbrook, Kent, in 1924—will take a leading part in commemorating the Silver Jubilee of the Corps, which is to be observed all over the country between April 15th and April 22nd. An exercise on Sunday, April 16th, to commemorate the occasion, will cover the Kent, Surrey and Sussex area—as did the first observer exercise, directed from Cranbrook, in June twenty-five years ago.

During the war the Southern Area posts were in the forefront of the Battle of Britain and gave the first warning of the crossing of the English Channel by German bombers. In the flying-bomb attacks, Southern observers first gave the code warning, *Diver*. Observers in the Southern Area helped save many millions of man-hours in factories engaged on war-work by giving last-minute "danger imminent" signals and earned the right to the shoulder flash "Seaborne" by acting as spotters on assault and landing craft during the D-Day Channel crossings.

The Corps originated in World War I, when Maj.-Gen. E. B. Ashmore, C.B., C.M.G., M.V.O., took command of home defence in 1917, and set up the first post at Cranbrook in 1924. For the first 14 years, after the Corps was officially established in 1925, it was manned by volunteers enrolled as special constables. The first Commandant, A. Cdre. E. A. D. Masterman, of Hook, Hants, took command in March, 1929, some two months after the Air Ministry assumed operational control, and in September, 1939, the Air Ministry took over administrative control from the Home Office. The Southern Area to-day comprises seven groups, centred on Maidstone, Horsham, Winchester, Oxford, Watford, Colchester and Beckenham, each controlling 30 to 40 posts.

Reunion

R.N. Seaplane Bases, Port Said and Alexandria.—28th annual reunion at Stewarts' Restaurant, Old Bond Street, London, W.1, on Saturday, April 1st, at 6 p.m. Chairman: F. A. Gill, Pine Lodge, Woodham Lane, Woking.



MARKS AND MARKINGS: Seen in the uniforms specified by their owners are five variants of the basic Hawker Fury Centaurus-powered fighter. At top is a Fury F.B. 60 for Pakistan and beneath it is a similar machine of the Royal Egyptian Air Force. There follow: A Sea Fury F.B.51, in Royal Netherlands Navy colours; a Fury 1 as supplied to Iraq; and a Sea Fury II in standard Naval Aviation camouflage.

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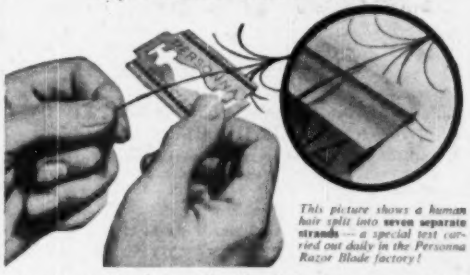

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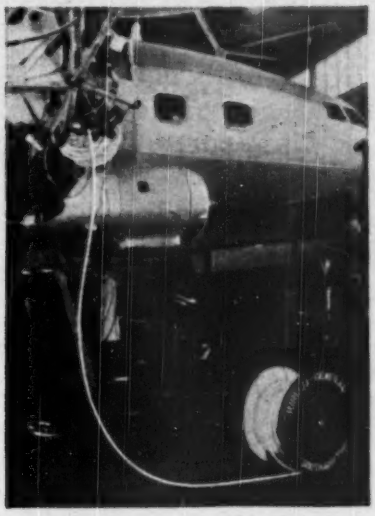

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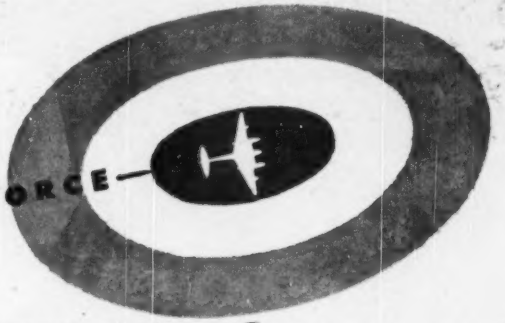

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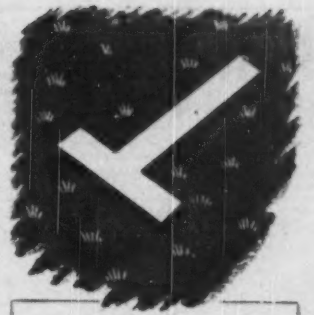

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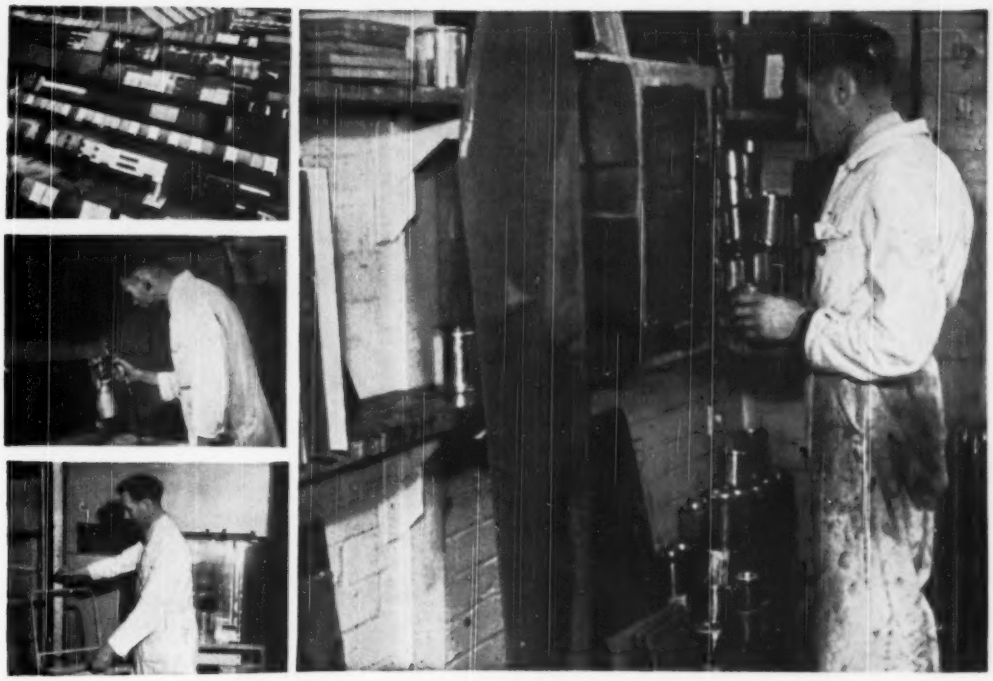

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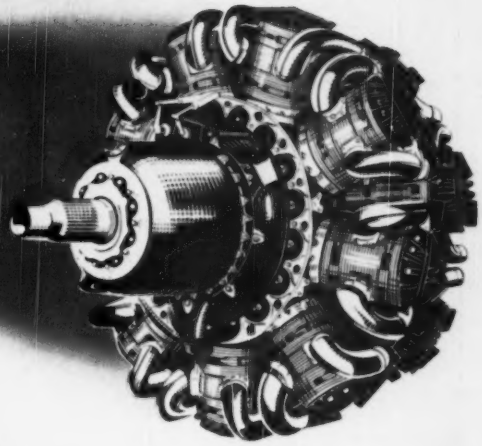

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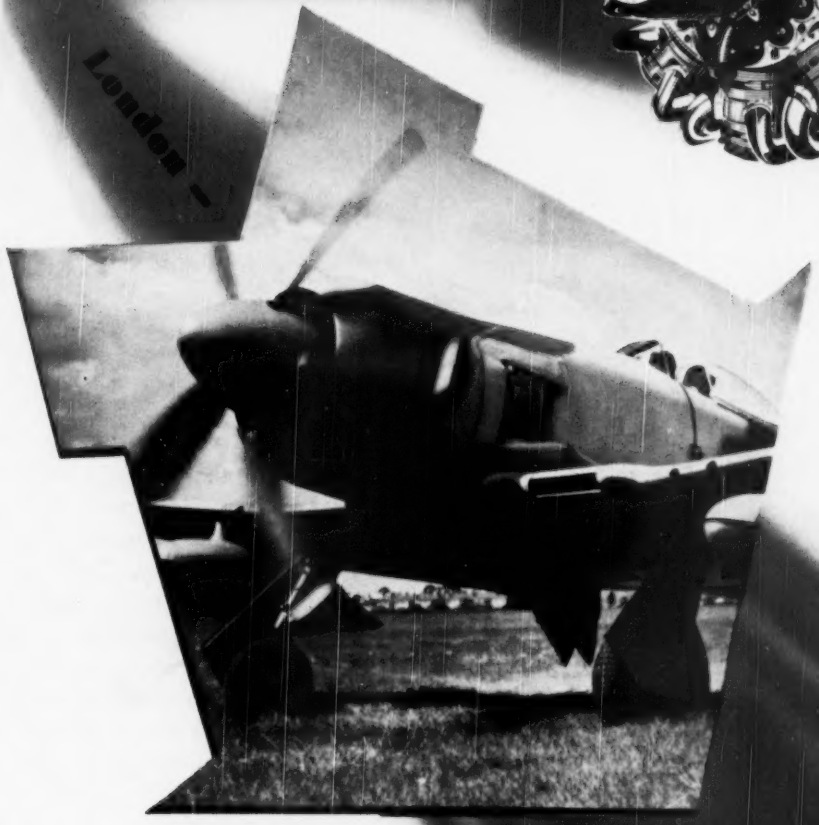

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